Program valid as at 6th February 2026

AARES
AUSTRALASIAN AGRICULTURAL & RESOURCE ECONOMICS SOCIETY

2026 Adelaide

70TH ANNUAL CONFERENCE OF THE AUSTRALASIAN AGRICULTURAL AND RESOURCE ECONOMICS SOCIETY

Transformations in Energy, Agri-Food and Environmental Systems

CONFERENCE HANDBOOK

9-13 Feb 2026

Program valid as at 6th February 2026

Welcome to AARES 2026 in Adelaide!

On behalf of the Australian Agricultural and Resource Economics Society (AARES), we are delighted to welcome you to the AARES 2026 Annual Conference, hosted in the vibrant city of Adelaide, South Australia. This year's conference brings together leading academics, industry professionals, policymakers, and students from around the globe to engage in critical discussions and share cutting-edge research in agricultural and resource economics.

Conference Highlights:

- **Keynote Speakers:** Renowned experts will address pressing issues in the field, offering fresh insights and innovative solutions.
- **Workshops & Panels:** Participate in interactive sessions covering a wide range of topics, from sustainable agriculture to resource management and climate change.
- **Networking Opportunities:** Connect with peers, forge collaborations, and expand your professional network through organised social events and informal gatherings.
- **Field Trips:** Experience South Australia's diverse agricultural systems and natural environments through guided tours showcasing local initiatives and innovations.

Location: The conference will take place at the Adelaide Convention Centre. Adelaide is known for its liveability, rich food and wine culture, and proximity to world-class agricultural regions. Attendees are encouraged to explore the city's vibrant cultural scene, parklands, nearby wine regions, and renowned local cuisine.

Program Information: The conference program is extensive and packed with engaging sessions. To support our commitment to environmental sustainability, we encourage attendees to access the program digitally via our official conference app or website and avoid printing unless necessary.

Stay Connected: Follow us on our official conference website and social media channels for updates, schedules, and important announcements.

Website: https://www.aares2026.net/index.html
Program: https://www.aares2026.net/conference-program.html

We look forward to an engaging and inspiring conference. Thank you for being part of AARES 2026!

The Local Organising Committee (LOC)

Program valid as at 6th February 2026

The AARES society acknowledges Aboriginal and Torres Strait Islander peoples as the First Australians. We recognise their cultures, histories and diversity and their deep connection to the lands, waters and seas of South Australia.

We acknowledge this land is the traditional lands for the Kaurna people and we respect their spiritual relationship with their country. We also acknowledge the Kaurna people as the custodians of the greater Adelaide region and that their cultural and heritage beliefs are still as important to the living Kaurna people today. We also extend that respect to other Aboriginal Language Groups and other First Nations.

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Sunday 8th February

Field Trip: Adelaide Hills

13:00 - 20:00 Sunday, 8th February, 2026

P Adelaide Hills

Full field trip description and format

Monday 9th February

Early Career Researcher Day

10:00 - 16:30 Monday, 9th February, 2026

P Flinders City Campus; One Festival Tower, Station Road, Adelaide 5000; Level 14, Room 1407

Full workshop description and format

ECR Networking Event: Sponsored by RAID

17:30 - 19:00 Monday, 9th February, 2026

P Flinders City Campus; One Festival Tower, Station Road, Adelaide 5000; Level 14, Room 1407

Program valid as at 6th February 2026

Tuesday 10th February

Early Morning Fun Run/Walk, Around the Torrens/Karrawirra Parri River

07:30 - 08:30 Tuesday, 10th February, 2026

Meet at Elder Park down from the Convention Centre at 7.30am.

See instructions here

Field Trip: Beeronomics

10:00 - 17:00 Tuesday, 10th February, 2026

P 258 Pulteney St, Adelaide
Full field trip description and format

Pre-Conference Workshops

Climate Resilience and Sustainable Rural Transformation: Solutions for the Asia-Pacific

09:00 - 16:00 Tuesday, 10th February, 2026

P Flinders City Campus; One Festival Tower, Station Road, Adelaide 5000; Level 6, Room 606

Yu Sheng[1], Tiho Ancev[2], Leonie Pearson[3]

[1]Australian National University, Canberra, Australia. [2]University of Sydney, Sydney, Australia. [3]University of Canberra, Canberra, Australia

This workshop directly addresses the AARES 2026 conference theme by positioning Rural Transformation (RT) as the core engine of change across the Asia-Pacific's energy, agri-food, and environmental systems. RT is defined as a dynamic process where rural economies diversify, incomes rise, and rural populations gain improved access to services, infrastructure, and opportunities. Achieving RT within planetary boundaries and above social foundations is essential for enhancing well-being, reducing poverty, and fostering inclusive, resilient rural communities. Crucially, RT represents a critical pathway for Low- and Middle-Income Countries (LMICs) to achieve the Sustainable Development Goals (SDGs) by leveraging agricultural development (AD) and broader structural transformation (ST). Furthermore, the pattern, path, and consequence of RT are deeply intertwined with Governance Capacity.

However, progress is threatened by a "triple challenge" of climate change, resource scarcity, which jeopardizes food security and rural livelihoods across the region. Overcoming these hurdles requires timely and targeted interventions, including investment in climate-smart technologies, resilient infrastructure, efficient resource management, and fair global markets. While significant research exists on RT, there remains a need for a deeper, comparative understanding of the diverse pathways developing economies can take and the specific policy levers that can accelerate progress.

This full-day workshop will bring together leading scholars from the Asia, Australia, and the United States to address these knowledge gaps. We will examine the complex interplay between technological innovation, resource management, and global trade in shaping sustainable rural futures. The workshop will foster knowledge exchange, identify collaborative research opportunities, and lay the groundwork for a proposed Special Issue in the Australian Journal of Agricultural and Resource Economics (AJARE).

Transformations in Agriculture and Environment under Uncertainty

10:00 - 16:00 Tuesday, 10th February, 2026

P Flinders City Campus; One Festival Tower, Station Road, Adelaide 5000; Level 3, Room 306

Greg Hertzler[1], Tim Capon[1], Helena Clayton[2], Todd Sanderson[3]

[1]CSIRO, Canberra, Australia. [2]ANU, Canberra, Australia. [3]ACIAR, Canberra, Australia

Transformations are big decisions-- adoption of the new and dis adoption of the old. This workshop is an interactive exploration of optimal adoption and dis adoption under uncertainty. It introduces the software ROAR (Real Options for Adoption and Resilience). Prior to the workshop, participants are encouraged to explore the RShiny app (https://real-options-adoption-resilience.shinyapps.io/GregsOUPShiny/) and become familiar with the Tutorials available under the Help menu. Participants are also encouraged to bring their own data to the workshop. The R console app and Excel versions will be available for download from GitHub. The uncertainty of any big decision is managed by keeping your options open. The price an option is the value of flexibility to avoid losses and take gains. Optimal adoption and dis adoption compare the value of flexibility to the other benefits and costs of an investment. An optimal decision threshold is where the value of flexibility no longer exceeds the other benefits and costs. At a decision threshold, you exercise an entry option and adopt or exercise an exit option and dis adopt. This is a real options analysis. Real option analysis can be applied to a range of research topics and applications in agriculture and the environment such as climate adaptation, the adoption of new technologies, and the resilience of agricultural and environmental systems. ROAR provides tools for: estimating stochastic processes; calculating option values, optimal decision thresholds and the expected times to reach biophysical or decision thresholds; and analysing sequences of decisions, and the resilience of environmental and agricultural systems. Representative examples and case studies are used to help relate participants' research or policy questions to the analytical framework. Although many researchers understand the importance of option values in agriculture and the environment, they have been unable to apply real options analysis without specialised expertise. This workshop makes the application of real options more accessible to AARES members by providing training in ROAR. ROAR supports a community of practice that further develops and applies these concepts across a range of research and policy contexts. The workshop has three overall objectives: To help build a community of practice among applied economists and scientists; To identify problems that researchers wish to solve and guide them in the methods and tools to solve them; To get feedback from workshop participants to enhance the community of practice, methods of analysis, software, and documentation. The workshop is relevant to people interested in understanding how the value of flexibility under risk and uncertainty affects the adoption of new agricultural or environmental management approaches and people interested in learning how to model and measure aspects of resilient systems. No background knowledge of real options analysis is required, although this workshop would be well-suited to people with some experience with the R statistical software or Excel. This

workshop is ideal for postgraduate students who already have, or can generate, time series that represent how biophysical or economic outcomes are affected by variability in prices, temperatures, etc, and wish to analyse alternative scenarios.

Wednesday 11th February

Keynote 1: Professor Moriah Bostian - Environmental Adjustments to Agricultural Total Factor Productivity. Sponsored by ABARES

09:00 - 10:00 Wednesday, 11th February, 2026

P Riverbank R2-R4

Keynote Speaker Bios

Parallel Session: Modelling, Uncertainty & Risk

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R2

Chair: Mitchell Scovell

Risk Analysis in Agritourism Enterprises Using GAMLSS - Donna Brennan Award Winner

Tho Quang Anh Nguyen[1], Huu Nhuan Nguyen[1], Dinh Thao Tran[1], Huu Chi Truong[2]

[1]Vietnam National University of Agriculture, Hanoi, Vietnam. [2]Macquarie University, Sydney, Australia

Keywords:

12. Econometric Modelling

28. Uncertainty and Risk

Paper Abstract:

Agritourism is an increasingly important strategy for diversifying farm income and improving rural livelihoods. Yet, the drivers of income risk associated with agritourism enterprises remain poorly understood, limiting the growth of the sector. In this research, we introduce the Generalised Additive Model for Location, Scale, and Shape (GAMLSS) as a flexible framework for analysing income distributions in agritourism. We illustrate the framework using the Johnson SU distribution, which is capable of modelling skewed and heavy-tailed data. Applying the model to a new dataset on accommodation agritourism in Vietnam, we find that labour input, firm size, and the share of female employees have positive impact on income, while firm size, labour input, technology adoption and low tourism demand increase income risk. In contrast, older farm operators and greater female labour participation help mitigate risk. These findings provide important insights for designing targeted risk management strategies to support the sustainable development of agritourism enterprises

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Machine Learning Approaches for In-Season Forecasting of Corn Acreage

Walter Ac Pangan[1], Nathan Hendricks[2]

[1]Virginia Polytechnic Institute and State University, Blacksburg, USA. [2]Kansas State University, Manhattan, USA

Keywords:

12. Econometric Modelling

28. Uncertainty and Risk

Paper Abstract:

Estimates of US corn acreage planted estimation are released in two reports. First is the "Prospective Plantings Report," released in March, and the "Acreage Report," published in June. The acreage values from these two surveys are later incorporated into the WASDE monthly reports. Most of these reports rely on statistical survey methods to gather data directly from the farmers, with information released on established dates throughout the year. Our study aims to develop machine learning models to deliver accurate and timely updates for in-season corn acreage forecasts. Our methodology employs a dataset from 1995 to 2020 with 92 variables on markets, weather, and field conditions to assess if publicly available data up to May can provide additional information to predict acreage allocation. The results reveal that we improve the accuracy level to forecast acreage planted. The RF model yields a Mean Absolute Error (MAE) of 33,440 acres, which is lower than the 88,744-acre MAE generated from USDA's Acreage Report estimates. Also, our findings demonstrate the significant predictive value added by incorporating the information of USDA's Prospective Plantings Report estimates into models. This indicates modeling complexity alone cannot compensate for the unique insights embedded in farmer survey data. Our study offers a valuable tool to generate a forecast of acreage planted that complements the information provided by the WASDE reports.

Risk and Safety Decisions in Forestry: A Prospect Theory Perspective

Ahsan Senan, Nadia A. Streletskaya, Yong Chen

Oregon State University, Corvallis, USA

Keywords:

3. Agricultural Production

28. Uncertainty and Risk

Paper Abstract:

Forestry occupies a unique position within the portfolio of agricultural and natural resource sectors. It is simultaneously a supplier of renewable raw materials, a provider of carbon storage and biodiversity services, and a key contributor to rural livelihoods. In the United States, forests underpin long-term strategies for decarbonization and climate resilience, supplying timber, biomass, and ecosystem services that are essential to the energy transition and to sustainable

agri-food and environmental systems. Yet forestry is also among the most dangerous industries, with logging workers facing a fatality rate of 100.7 per 100,000 full-time equivalent workers—27 times higher than the national average (CDC, 2024). In addition to rare catastrophic accidents from falling trees or heavy machinery, workers regularly encounter frequent minor injuries such as cuts, sprains, and back pain. The combination of everyday risks and low-probability catastrophic events highlights a critical challenge: achieving safe, sustainable, and productive forestry requires careful navigation of safety–cost tradeoffs in environments of uncertainty.

This paper investigates how decision-makers in forestry manage these risks and what this implies for the modeling of risk preferences in resource economics more broadly. We conduct a forestry-framed laboratory experiment in which participants repeatedly choose whether to invest in safety across two controlled environments: one featuring high-probability, low-loss injuries and the other involving low-probability, high-loss accidents. Importantly, the expected payoffs across the two environments are identical, allowing us to isolate behavioral responses to risk frequency and severity.

The results reveal systematic departures from expected utility theory. Participants consistently under-reacted to frequent risks and over-reacted to rare risks, a behavioral pattern well captured by prospect theory's probability weighting function. Structural estimation of decision parameters confirms strong risk aversion, significant loss aversion, and inverse-S shaped probability weighting. Moreover, the experiment shows that early experiences with realized risks generate persistent caution in subsequent choices, even when objective probabilities remain unchanged. This path dependence underscores the importance of learning and experience in shaping long-term risk behavior in hazardous sectors.

These findings have two key implications. First, they demonstrate that prospect theory provides a more accurate description of safety decision-making in forestry than expected utility models, aligning with growing evidence that behavioral economics offers critical insights into risk management in resource sectors. Second, they highlight the policy and management relevance of modeling risk perceptions and behavioral responses explicitly. If managers under-invest in protection against common injuries but over-invest in catastrophic but rare risks, then traditional one-size-fits-all safety policies may fail to achieve efficient outcomes. Tailored interventions, such as experiential safety training, targeted incentives, or adaptive safety standards, may better align risk behavior with socially optimal outcomes.

More broadly, this research situates forestry within the wider challenges of transitioning to sustainable resource management. Understanding how decision-makers perceive and respond to risks is essential not only for forestry but also for other agricultural and natural resource sectors facing similar tradeoffs between productivity, safety, and sustainability.

Valuing Water Quality and Quantity Trade-offs from Irrigation in the San Salvador Basin, Uruguay – An Integrated Approach

Akash Gokhale[1], Moriah Bostian[2], Francisco Rosas[3], Tiho Ancev[1]

[1]The University of Sydney, Sydney, Australia. [2]Lewis & Clark College, Portland, USA. [3]ORT University, Montevideo, Uruguay

Keywords:

3. Agricultural Production

27. Productivity and Efficiency

31. Water

Paper Abstract:

Greater interannual rainfall variability due to climate change has caused previously rainfed agricultural land to become partially dependent on supplemental irrigation. Due to constrained natural resources – especially arable land – further intensification of rainfed agricultural land through supplemental irrigation is required for ensuring food security for an increasing global population. However, supplemental irrigation, often paired with increased use of commercial fertilisers, though instrumental for increasing agricultural productivity, has exacerbated the environmental conditions of ecosystems affected by agriculture and must be sustainably balanced against the environmental costs. Key challenges that must be managed are decreased water availability and compromised water quality. In this study we evaluate *ex-ante* the trade-offs between economic benefits of supplemental irrigation and its environmental costs for the case study of San Salvador Basin in Uruguay. We use biophysical and production data consisting of inputs (including irrigation water), weather conditions, desirable output (crop revenue), and undesirable outputs (Nitrate and Phosphorus runoff) simulated through the Soil and Water Assessment Tool (SWAT) calibrated for this basin. The SWAT model simulates individual Hydrological Response Units (HRUs) through multiple scenarios comprising three supplemental irrigation levels and three levels of fertiliser application intensity, and a baseline scenario of just rainfed agriculture with currently practiced fertiliser rates. Each HRU-scenario combination is treated as an observation unit. We estimate shadow prices for undesirable outputs and for irrigation water and derive inefficiency measures for each HRU-scenario combination using output-oriented and input-oriented quadratic directional distance functions. We also perform a sensitivity test for different directional vector specifications, placing varying emphasis on reducing undesirable outputs versus increasing desirable output. The results derived using MATLAB show substantial variation in shadow prices across HRU-scenario combinations suggesting a targeted policy approach might be beneficial. Overall, phosphorus has a substantially higher shadow price ($4.99/hectare) on average in all scenarios than nitrate ($2.01/hectare) suggesting a higher marginal abatement cost potentially due to its lower relative load. We found the scenario with medium level of supplemental irrigation development and with relatively higher fertiliser rates to be most efficient on average, and the scenario with low level of supplemental irrigation development and relatively low fertiliser rates to be least efficient on average. This finding suggests that some supplemental irrigation development in the basin would be economically beneficial, even after explicitly considering the environmental

consequences of such development. Shadow prices for supplemental irrigation, which can be interpreted as the benefit of another millimetre (mm) of irrigation water or the implicit benefit of another mm of rainfall, suggest that higher irrigation levels are optimal towards the mouth of the basin. HRUs with high shadow prices for undesirable outputs and high inefficiency scores should not be considered for development of supplemental irrigation in this basin. This analysis showcases how methods of productivity and efficiency analysis can be successfully integrated with a biophysical model to derive indicators that are directly useful for policy implementation. These findings are broadly relevant, and the approach can be implemented in a straightforward way to case-studies in Australia and elsewhere.

Regional uncertainty and community wellbeing: evidence from Narrabri, NSW

Rod McCrea, Mitchell Scovell, Andrea Walton

CSIRO, Brisbane, Australia

Keywords:

19. Impact Assessment

28. Uncertainty and Risk

Paper Abstract:

Large regional projects can significantly shape community wellbeing, yet research on the uncertainty surrounding project commencement is scarce. We examine the Narrabri Shire (NSW) during ongoing delays and contestation over the Narrabri Gas Project (NGP), acquired in 2011 and approved by governments in 2022, with no final investment decision yet made. A CATI survey of 300 residents (May–June 2025) was used to examine regional uncertainty using quota sampling by age, gender and location and data weighting for representativeness. Perceived uncertainty about whether the NGP would proceed did not directly increase regional uncertainty; the effects depended on attitudes to CSG. Among supporters, higher project uncertainty predicted higher regional uncertainty; among opponents, it predicted lower regional uncertainty. More generally, regional uncertainty was associated with lower local community wellbeing when perceived community adaptation was not high. Also, economic diversity was positively associated with local wellbeing when regional uncertainty was not high. Expectations for future regional wellbeing declined as regional uncertainty rose, though perceived coping and adapting buffered this effect. Perceived economic diversity also compensated for the effect of regional uncertainty on expectations of future regional wellbeing. During prolonged decision lags around contested developments, the impact on regional uncertainty depends on stance toward the project. Still, regional uncertainty undermines both local community and future expectations of wellbeing, and policies that strengthen perceived coping, adapting, and economic diversification protect and enhance wellbeing in these circumstances.

Parallel Session: Environment & Wellbeing

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R3

Chair: R. Quentin Grafton

Travel motivations and destination choice: a study of Australian and Chinese outbound market

Yanyan Dong, Michael Burton, Abbie Rogers

University of western australia, Perth, Australia

Keywords:

9. Consumer Choice

25. Policy Analysis

Paper Abstract:

International tourism continues to expand, driving economic activity while creating challenges for environmental conservation. Understanding the real-world drivers of destination choice is essential for transforming tourism systems to balance economic development with environmental sustainability. This study examines and compares how internal travel motivations, perceptions of destination attributes, perceptions of environmental sustainability, and trust influence destination choices among two culturally distinct groups—Australians and Chinese. An online survey was conducted with 510 Australian and 608 Chinese respondents who had undertaken an overseas trip of at least three nights since 2015 and made the choice of destination. Structural Equation Modelling (SEM) was used to analyse the relationships between internal motivations, perceptions, trust, and destination choice in a cross-cultural context.

The findings reveal that perceptions of environmental sustainability significantly influence preferences for natural, cultural, and urban destinations among both Australian and Chinese tourists but have little impact on preferences for marine and coastal or water-based destinations. This suggests that sustainability concerns are context-dependent: natural areas align with preservationist values, while cities and towns may benefit from visible green initiatives. Conversely, marine and coastal tourism appears more hedonism-driven, with sustainability perceived as secondary. Tourists visiting coastal areas may prioritise enjoyment (e.g., relaxation) over sustainable considerations. These insights indicate an opportunity for destination managers to improve the visibility of coastal sustainability initiatives, such as coral restoration programs, to attract eco-conscious travellers and align tourism practices with environmental goals.

Among Australian tourists, perceptions of environmental sustainability strongly influence tourist trust, highlighting the role of responsible environmental practices in shaping confidence

in a destination. This relationship, however, was not observed among Chinese tourists. Tourist trust plays a positive strong role in determining loyalty for both Australian and Chinese tourists, emerging as the most critical factor for repeat visitation. In terms of internal motivations when choosing marine and coastal destinations, Australian tourists are driven by three factors: social and engagement, escape and novelty, and rest. Individualism, adventure, and social interaction are central to Australian culture. Chinese tourists are motivated by three factors: interest and nature exploration, emotional and family well-being, and rest. In terms of perceptions of destination, for Australian tourists, scenery and cost are significant factors in marine and coastal destination preferences, while for Chinese tourists, scenery and safety, and cost and language are significant factors in water-based destination preferences. Income influences Australians' intentions to visit cities and towns, with higher-income travellers favouring urban trips, but this shows no significant effect for Chinese respondents. These findings have important implications for policy and planning. They underscore the need for culturally tailored strategies—emphasising sustainability and novelty for Australians and convenience, safety, and family-friendly experiences for Chinese travellers—to enhance destination competitiveness. Furthermore, integrating visible sustainability initiatives into tourism offerings and fostering collaboration between governments, industry, and communities are critical steps toward transforming tourism systems into more economically resilient and environmentally sustainable sectors.

Modelling Green Job Attraction in Australia: Linking Environmental Values and Pro-Environmental Behaviour in Workforce Supply

Mallika Roy[1,2], Azad Rahman[1], Delwar Akbar[1], Darshana Rajapaksa[1,3]

[1]Central Queensland University, Rockhampton, Australia. [2]University of Chittagong, Chittagong, Bangladesh. [3]Department of the Environment, Tourism, Science and Innovation, Queensland Government, Brisbane, Australia

Keywords:

12. Econometric Modelling

14. Environmental Economics

Paper Abstract:

Global agri-food systems are under mounting pressure from escalating food waste, inefficient resource use, and chronic workforce shortages, all of which undermine the long-term viability of horticulture and other green industries. These interrelated challenges create economic losses, increase greenhouse gas emissions, and weaken the capacity to maintain biodiversity and food security. Without targeted action, shortages of skilled, environmentally committed workers will hinder the adoption of circular economy practices and low-carbon growth, as successful CE transition demands technology and a motivated workforce to reduce waste and protect ecosystems. Yet the mechanisms linking environmental attitudes and normative pressures to labour market choices remain underexplored. This study examines how environmental attitudes and normative influences shape pro-environmental behaviour and green job

attraction, informing the economic drivers of a low-carbon, resource-efficient economy. Grounded in environmental economics, it conceptualizes the workforce as a pivotal agent of change in internalizing environmental externalities and delivering ecosystem benefits. A structured questionnaire was administered to 1,202 respondents across Queensland, Australia, focusing on horticulture as a prototypical green industry. The survey used validated multi-item scales to measure six latent constructs: four independent variables—environmental consciousness, environmental commitment, personal norm, and social norm—and two dependent variables—pro-environmental behaviour and green job attraction. These constructs capture how individual preferences, normative pressures, and behavioural intentions shape the supply of green labour. The data provide microeconomic evidence on how environmental preferences and social norms support public goods such as waste reduction and biodiversity preservation in horticultural supply chains. The study applies advanced econometric modelling within the Structural Equation Modelling (SEM) framework using IBM SPSS AMOS 29 Graphics. Measurement models confirmed construct validity, internal consistency, and discriminant reliability, while structural models tested direct, indirect, and total effects. SEM enabled simultaneous estimation of interdependent relationships and effect decomposition, essential where behaviour, norms, and labour market choices reinforce one another. Results show that pro-environmental behaviour is the key mediating dependent construct linking environmental attitudes and norms to green job attraction, the final dependent outcome. Personal norm is the strongest positive predictor of pro-environmental behaviour, underscoring the role of moral obligation and intrinsic motivation. In contrast, environmental consciousness exhibits a negative behavioural effect, revealing a persistent value–action gap. All four independent attitudinal and normative constructs exert significant direct effects on green job attraction, even when their indirect behavioural influence is limited. By integrating environmental economics and rigorous econometric modelling, this study clarifies how value alignment, behavioural reinforcement, and labour market incentives interact to drive the supply of green skills. Policy priorities include embedding environmental education, promoting value-based career pathways, and investing in supportive infrastructure to nurture pro-environmental behaviours and reduce transaction costs for green employment. These measures can curb food waste, enhance resource efficiency, and foster sustainable horticultural growth and circular economic development. The findings underscore that achieving a resilient, low-carbon workforce requires coordinated policy action linking environmental values to economic incentives, ensuring an adequate and skilled workforce supply to meet rising green-job demand and support the circular economy with a motivated and capable labour force.

A Better Life with Biodiversity: Wellbeing and Economic Gains from Visiting Different Parks

Jiangiang Huang[1], Patrick O'Connor[1], Anna Ziersch[2]

[1]Adelaide University, Adelaide, Australia. [2]Flinders University, Adelaide, Australia

Keywords:

5. Biodiversity

14. Environmental Economics

Paper Abstract:

While park visitation is well known to benefit human health and wellbeing, the economic value of visits to biodiverse parks remains less clear. This study investigates the potential health and economic gains across sociodemographic groups and visitation patterns to high-quality biodiverse parks in the Adelaide metropolitan area.

Preliminary results show distinct visitation patterns across park types and highlight links between the Personal Wellbeing Index (PWI), BIOWELL (biodiversity-related wellbeing), park type (urban vs national), bird functional diversity (morphological and chromatic traits), visitor sociodemographics, and activities. Regression modelling indicates that PWI is positively associated with age, visitation frequency, income, and BIOWELL, particularly the connection to "living things in this park". Although urban park visitors generally reported higher PWI due to stronger sociodemographic factors, the natural qualities of national parks played an important role in enhancing wellbeing, especially among visitors from lower socioeconomic backgrounds. For instance, older adults (75+) consistently reported higher PWI than younger adults (18 to 34) in both park types, but the gap was greater in national parks, suggesting stronger health benefits for older adults in these settings. A preliminary health-economic valuation estimated a potential US$2 million per annum per person benefit for older adults choosing national parks over urban parks compared with younger adults.

Overall, this study highlights the significant contribution of biodiversity to human health, provides evidence supporting healthier lives in biodiverse environments, and demonstrates the wider benefits of investing in improved environmental quality.

Modelling demand and supply of diving and snorkelling trips on the Great Barrier Reef

Gabriela Scheufele[1], Daniel Granger[2], Jeremy deValck[3], Anthea Coggan[1]

[1]CSIRO, Brisbane, Australia. [2]CSIRO, Townsville, Australia. [3]CQU, Brisbane, Australia

Keywords:

9. Consumer Choice

12. Econometric Modelling

Paper Abstract:

The world heritage listed Great Barrier Reef (GBR) attracts both domestic and international visitors for its outstanding snorkelling and diving sites. However, degrading coral reef conditions might reduce their attractiveness and, consequentially, the demand for commercially operated coral reef based diving and snorkelling trips.

We propose a linked demand and supply model to simulate how changes in coral reef condition could affect the sites' attractiveness to visitors in terms of their substitution behaviour. The model is designed to be based on two separate survey-based discrete choice experiments (DCE): one conducted with commercial operators offering snorkelling and diving trips to a set of coral reefs and one conducted with visitors purchasing them. The sample of visitors will be randomly drawn during trips across a representative set of coral reefs (e.g., coral reef quality, region, trip

type, and trip duration). Random utility modelling (RUM) will be used to model site choice; that then informs an estimate of and account for substitution behaviour. The visitor survey will also include visually assisted questions to estimate a function that relates a change in objective coral reef condition and perceived coral reef attractiveness.

The model enables simulating how changes in perceived coral attractiveness, as a function of changes in objective coral reef condition, affect the choice of trip locations (coral reefs) offered by tour operators and demanded by visitors. Simulations include changes in consumer and producer surplus as well as changes in market shares across major regions of the GBR and an opt-out alternative. Estimated visitation numbers are calibrated using the simulated market shares and observed visitor numbers per region.

In this paper, we present the linked demand-supply model as well as the corresponding design of the DCE choice sets and envisioned RUM specifications that underpin the model. Challenges and proposed solutions in designing the model are discussed with a focus on managing the large number of coral reefs that make up the GBR and the mix of domestic and international visitors.

Is Global Human Well-Being Peaking?

R. Quentin Grafton[1], Long Chu[1], Tom Kompas[2], Safa Fanaian[1]

[1]Australian National University, Canberra, Australia. [2]University of Melbourne, Melbourne, Australia

Keywords:

8. Climate Change

11. Ecological Economics

Paper Abstract:

We undertook multiple individual country time trend analyses using post 1990 data. We estimated that real GDP per capita and life expectancy at birth, together, should have peaked before 2050 for about two-thirds of the world's population and at levels far below their current values in upper high-income countries. That is, there are 'flourishing' countries where human well-being is already high and will likely increase, but a much larger group of 'languishing' countries where human well-being has peaked, or will likely peak, before 2050. We also found a positive time-series association between real per capita income and broader composite (e.g. Human Development Index) well-being indicators but this association declines in the level of income. A mitigation response to peaking human well-being is global cross-country monetary transfers from higher- to lower-income countries. Thus, we calculated two possible global transfers: one equal to 1.3 trillion/year USD in total and an alternative based on the projected climate change damage to low to middle-income countries. Each global transfer would impose only a relatively small cost on national income of contributing countries but would likely provide large average human well-being benefits to low-income countries.

Parallel Session: Drought: Sponsored by SA Drought Hub

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R4

Chair: David Fleming-Muñoz

The economic impact of drought on agriculture in Australia

Jiaqi Fan, Alec Zuo, Sarah Wheeler

Flinders University, Adelaide, Australia

Keywords:

2. Agricultural Finance

8. Climate Change

Paper Abstract:

This study investigates the short and long-term economic impacts of drought on farmland businesses by industry across Australia, with a particular focus on adaptation and intensification. We use fixed effects panel regressions to model business financial indicators from the Business Longitudinal Analysis Data Environment (BLADE) of the Australian Bureau of Statistics (ABS), covering around 3.2 million observations from 2001-02 to 2022-23. Drought conditions are measured using the self-calibrating Palmer Drought Severity Index (SC-PDSI), supplemented by temperature and precipitation data from the Bureau of Meteorology (BOM).

Our findings indicate that one-unit decrease of SC-PDSI for drier generally lead to around 0.33% reductions in turnover and around 0.18% in total expenses contemporaneously, though the effects of drought on net income remain statistically insignificant. Conditional on drought in the previous 12, 24 and 36 months, current droughts tend to have intensified effects on farm financial performance. Industry sector analysis across broadacre farming, horticulture, livestock, and mixed farming demonstrates droughts' heterogeneous effects. For example, horticulture appears less affected, broadacre farming is highly sensitive to the current-year drought, and livestock businesses are more vulnerable to drought conditions in the past three years.

To assess long-term effects of drought, this study integrates historical precipitation and temperature exposure at the postcode level using 30 years of data (1970- 2000). Results show that farmland businesses in regions with higher long-term rainfall are more sensitive to drought and experience more severe financial impacts than those in lower long-term rainfall areas. Interestingly, a rising long-term temperature may mitigate drought effects to some extent, suggesting potential adaptions in higher temperature areas.

These findings highlight the complexity of drought's economic effects and identify the conditions under which farms have adapted to drought or been impacted more intensively in the long term.

How does the value of investing in Australian water entitlements compare to other investments over time?

Mubeen Abdur Rehman[1], Sarah Wheeler[2,1], Duygu Yengin[1], Nadezhda Baryshnikova[1]

[1]University of Adelaide, Adelaide, Australia. [2]Flinders University, Adelaide, Australia

Keywords:

2. Agricultural Finance

31. Water

Paper Abstract:

Water markets are widely recognised for enhancing the efficient use and redistribution of water, with the southern Murray-Darling Basin (MDB) in Australia considered the most advanced water market worldwide. This paper applies a Dynamic Conditional Correlation Generalised Autoregressive Conditional Heteroskedasticity (DCC-GARCH) model to provide the first long-run assessment of MDB water entitlements as financial assets, evaluating their value, hedging capacity, and safe-haven potential relative to national investment portfolios from July 1993 to June 2025. The findings reveal variable results for water markets. The internal rate of return (IRR), on average, of investing in water entitlements exhibits lucrative returns of up to 19.98% surpassing the national stock market (4-5%) and real estate investment options (4-8%), driven by water scarcity, market maturity, and government buybacks; however, these returns fluctuate in line with market cycles. The outcomes further indicate that water entitlements provide safe-haven benefits to their investors during market turmoil, particularly in the stock market. Subsequently, the Australian water market is becoming more liquid and heterogeneous. The results are significant for irrigators, investors, portfolio managers and policymakers to consider when implementing portfolio strategies and policy decisions.

Estimating irrigation water use at a regional scale using remotely sensed data: a case study of the Murrumbidgee Irrigation Area

Leon Tang

Murray-Darling Basin Authority, Canberra, Australia

Keywords:

3. Agricultural Production

31. Water

Paper Abstract:

The paper discusses the experimental analyses undertaken to estimate the quantum of irrigation water use at a regional scale using multiple data sources, including remotely sensed evapotranspiration. The case study area, the Murrumbidgee Irrigation Area, is a key agricultural region in Australia. The paper considers how advances in remote sensing and analytical

methods may be leveraged to help measure commodity-level water use from rainfall and irrigation, as well as agricultural production in areas of single or mixed crops during wet and dry years. It seeks to combine observed evapotranspiration, precipitation, and hectares of annual crops and permanent tree crops over time, to quantify the spatio-temporal correlations that may be used to estimate irrigation water demand at a regional scale.

This analysis aims to support the Murray-Darling Basin Authority's ongoing data collection and monitoring of the trends and conditions in the Basin's industries and communities, which will inform the adaptive management of water policy in the Murray-Darling Basin. This analysis will build on learnings in the literature, leverage publicly available satellite observation data, and consider the uncertainty and limitations of its approach using data from different sources.

Impact and Adaptation to Drought in Australian Grain Production: A Benefit–Cost and Risk Analysis

Jahangir Kabir[1], Keely Harris-Adams[2], Giacomo Betti[3]

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Keywords:

18. Grains and Cropping Systems

19. Impact Assessment

Paper Abstract:

Australian grain growers face significant challenges in crop establishment due to varied knowledge about the optimal time for dry seeding and the unavailability of suitable seeder settings. Addressing these issues is a national priority for mitigating the impact of drought on the sustainability of grain producers. This study aims to: (i) evaluate the impact of drought on the productivity and economic viability of major grains in Australia under current and improved agronomic practices, including optimal dry seeding timing and seeder configuration; and (ii) assess the economic viability of GRDC's investment in research, development, and extension of those improved agronomic practices.

Quartile, biannual, and annual Standardised Precipitation and Evaporation Index (SPEI) were developed to assess the impact of drought on crop performance across different rainfall zones under historical climate conditions (2000-2024). Economic viability of major grain crops under current and improved adaptation practices was evaluated through developing enterprise and stochastic budgets. An ex-ante benefit–cost analysis (BCA) was conducted, and a Monte Carlo simulation with 100,000 iterations was run to assess the economic viability of GRDC's investment in early dry sowing and optimised seeder configurations.

We found a strong positive correlation between the biannual SPEI (May–October) and the yields of wheat, barley, and canola in southern Australia, as well as a moderate to strong association between the nine-month SPEI (March–November) and crop yields in western

regions. This suggests that soil moisture during these periods plays a significant role in the performance of winter crops. A quartile SPEI for March–May and September–November, with grain yield of the crops, showed a significant moderate positive association, highlights the critical role of moisture on crop performance during germination and reproductive phases. Conversely, quartile SPEI for December–February and June–August displayed only weak associations, indicating limited impact of moisture stress during the vegetative stage on winter crop performance.

In dry years, per hectare yields of wheat, barley, and canola respectively decreased by 23%, 18% and 13% in western regions and by 29%, 47% and 54% in the southern regions than that of typical seasonal yield, indicate that the southern region is considerably more susceptible to drought than the western region. Our analysis further reveals that not only was the yield loss of the crops offset notably in the dry years, but also increased yield in the typical seasonal conditions, consequently increasing the economic viability of these crops markedly due to the adoption of improved agronomic practices, particularly early dry sowing combined with optimal seeder configuration for uniform crop establishment compared to current grower practices. The base case BCR of the RD&E investment was 9:1. Monte Carlo simulation analysis confirmed that the probability of achieving a BCR of 5-10:1 was 95%, which confirms the economic viability of the investment.

Assessing the Economic Impacts of Drought Using the Synthetic Control Method

David Fleming-Muñoz[1], Tim Capon[2], Ernesto Valenzuela[1], Graham Bonnett[3]

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Keywords:

28. Uncertainty and Risk

31. Water

Paper Abstract:

Understanding the economic consequences of drought is essential for designing effective resilience strategies in agriculture and regional economies. However, quantifying these effects remains challenging due to data limitations and the complexity of causal inference. This paper applies the Synthetic Control Method (SCM) to estimate the impact of the 2017–2020 drought on agricultural activity in three key inland regions of New South Wales (NSW), Australia: the NSW North West, Central West, and Riverina regions. Using a 30-year panel from the ABARES Australian Agricultural and Grazing Industries Survey, we construct counterfactual trajectories for each region's '*total cash receipts per unit of labour*' (*TCRpL*)—a proxy for farm labour productivity—in the absence of the drought shock. Results reveal substantial spatial variation. The North West experienced a short-term 56% labour productivity gap but showed full recovery by 2022, while the Central West experienced a similar drop but an incomplete recovery to 2020. In contrast, the Riverina region displayed limited divergence from its synthetic control, indicating greater resilience. These findings underscore the need for regionally differentiated

drought adaptation strategies that account for local production structures, exposure, and recovery capacity. The paper demonstrates the utility of SCM in climate impact assessments and provides robust evidence to support spatially targeted agricultural policy and resilience planning in drought-prone regions.

Parallel Session: Energy Policy Analysis

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R5

Chair: John Quiggin

Carbon pricing revenue recycling under ETS-2 to reduce energy poverty. The case of Poland

Jakub Sokolowski[1,2], Marek Antosiewicz[3]

[1]University of Warsaw, Warsaw, Poland. [2]Insititute for Strucutral Research, Warsaw, Poland. [3]Warsaw School of Economics, Warsaw, Poland

Keywords:

12. Econometric Modelling

13. Energy and Utilities

25. Policy Analysis

Paper Abstract:

We evaluate how the European Union's new Emissions Trading System for buildings and road transport (ETS-2) and the accompanying Social Climate Fund (SCF) can be designed and sequenced to protect vulnerable households while sustaining public support for ambitious carbon pricing. Focusing on Poland, the largest SCF beneficiary, we compare two revenue-recycling strategies: (i) direct cash transfers to households and (ii) investments in energy-efficiency and clean heat. We ask which instruments best reduce energy poverty at different transition points and how to combine them into a politically and socially robust policy mix.

Methodologically, we link a household-level microsimulation to a general-equilibrium-consistent carbon price path to project the distributional outcomes of ETS-2 over 2027–2050. Energy poverty is measured with a Low-Income-High-Cost (LIHC) indicator tailored to Polish data.

Results show a clear temporal trade-off. In the first year of ETS-2 (2027), absent mitigation, the LIHC energy-poverty rate reaches 10.4%. Front-loaded cash transfers cushion this shock, cutting the rate to 9.8% (−0.6 percentage points versus baseline), whereas an investment-only start yields 10.1%—a modest improvement that reflects implementation lags. By 2030, however, accumulated efficiency gains make the investment path outperform transfers: LIHC falls to 8.1% under investments versus 8.5% with transfers and 9.1% in the baseline. Over the medium run, the transfers scenario gradually converges toward baseline as stipends lose salience, while structural upgrades in the investment scenario continue to depress energy needs and bills. By the 2040s, all scenarios converge toward very low energy-poverty incidence (<0.5%) as the stock upgrades; nevertheless, the cumulative years spent in energy poverty are lowest when early transfers are paired with rapid scaling of investments.

Substantively, the findings imply that transfers and investments are complementary phases of a just-transition strategy. Transfers are essential at entry (2027–2032) to prevent a surge in hardship and to bolster the acceptability of carbon pricing; investments are indispensable for durable relief by tackling root causes—leaky buildings and fossil-dependent heating. This sequencing aligns with the SCF's architecture, caps temporary income support, prioritises structural measures, and suggests operational designs that link recipients of early cash relief into retrofit pipelines. A pragmatic policy rule emerging from our analysis is "cash now, capital always": deploy generous, time-bound transfers at the onset of ETS-2 while committing the bulk of funds to deep retrofits and clean heating targeted at low-income, high-need homes.

Assessing the Efficiency and Impact of Australia's Renewable Energy Target

Xiyu Ni

University of Adelaide, Adelaide, Australia

Keywords:

13. Energy and Utilities

25. Policy Analysis

Paper Abstract:

Green transitions are essential for establishing a more sustainable and eco-friendly economy. The energy sector in Australia has seen substantial modifications throughout the decades, with the Renewable Energy Target (RET) promoted as having an important role in facilitating the decarbonisation of electricity generation by influencing costs and investment incentives.

This paper investigates the impact of RET in Australian electricity markets from both a theoretical and an empirical perspective. I develop a theoretical model of the wholesale electricity market, which is influenced by the retail market. The model accounts for various firm types, different fuel types, and capacity constraints, aiming to capture RET-induced changes in marginal costs and examine their transmission effects on market quantities and prices. In the empirical analysis, I have compiled a panel of monthly electricity generation data for each of the eastern Australian states from 1999 to 2023, disaggregated by generation type. I employ a contemporary method to evaluate the impact of the federal RET using matched US states as a synthetic control group, allowing the identification of state-level responses.

The analysis offers three contributions. First, it provides a realistic theoretical framework for energy generation that considers differences in cost and capacity between alternative energy providers. Second, it derives testable empirical hypotheses from the theoretical implications. Third, it identifies state-level analysis of policy transmission. I find that the RET effectively reduces per capita fossil fuel-based electricity consumption, which is consistent with theoretical predictions. However, the analysis reveals temporal variation in policy effectiveness; that is, the RET achieved lower per capita fossil fuel-based electricity consumption in the first half of the study period, but the effect has diminished over the last decade. State-level results demonstrate varying outcomes in policy responsiveness; that is, South Australia exhibits the

most active adjustment, followed by a gradual reaction from New South Wales and Victoria, while Queensland displays minimal change.

How Wind and Solar Erode Generator Revenues: Evidence from Australia's National Electricity Market

Yating Deng, Paul Burke

Australian National University, Canberra, Australia

Keywords:

13. Energy and Utilities

14. Environmental Economics

Paper Abstract:

This paper uses daily data from 386 power generators in Australia's National Electricity Market to quantify the impacts of state-level wind and solar generation on generator electricity sales revenue. Variation in maximum wind and solar generation potential is used to instrument wind and solar generation shares. Results show that a percentage point increase in the state daily wind and solar shares on average leads to 1.58% and 2.78% reductions in daily generator revenues, respectively. Wind and solar generation benefit their own generators but lower the revenues of coal, gas/diesel, and hydro generators. Additional daily wind generation impairs generator revenues throughout the day, whereas for solar there are negative effects during daylight and positive effects in the evening. Effects emerge via altered generator dispatch patterns and reduced wholesale electricity prices. The findings detail a key phenomenon experienced by this wholesale electricity market and are relevant for other countries undergoing similar transitions.

Policy Effects and Determinants of National Hydrogen Strategies - SA Branch Prizewinner

Ryan Singleton

University of Adelaide, Adelaide, Australia

Keywords:

13. Energy and Utilities

25. Policy Analysis

Paper Abstract:

The global transition to low-carbon energy has led many countries to adopt national hydrogen strategies, yet their policy impacts and adoption drivers remain poorly understood. This thesis investigates these issues using panel data for 49 countries from 2010 to 2023. Policy impacts are assessed via a staggered difference-in-differences framework, while the determinants of adoption are analysed using a fixed-effects linear probability model. Our

findings reveal a strong commitment to national hydrogen strategies, with a substantial increase in public hydrogen and carbon capture RD\&D budgets. However, national hydrogen strategies had yet to achieve emissions reductions, with no reduction in emissions from industrial processes observed. Furthermore, after controlling for country fixed effects and time trends, renewable electricity output had emerged as a key determinant of adoption. In contrast, macroeconomic factors were found to play a limited role in the adoption of national hydrogen strategies.

New obstacles to the energy transition

John Quiggin

University of Queensland, Queensland, Australia

Keywords:

8. Climate Change

28. Uncertainty and Risk

Paper Abstract:

Quiggin (2024) argued that the irresistible force of clean and cheap solar energy would overcome the seemingly immovable obstacle of an entrenched stock of capital based on coal, oil and gas. Since then, new political obstacles have emerged, most notably with the election of the Trump Administration in the US. In this paper, I argue that these obstacles can delay the energy transition, but not prevent it.

Parallel Session: Agricultural Transformation: Sponsored by PIRSA

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R6

Chair: David Adamson

Facilitating agricultural transformations and water security in Northern Australia: environmental and economic considerations for water quality monitoring of impoundments

Nicole Flint[1], John Rolfe[1], Dylan Irvine[2], Kaline De Mello[2], Paula Cartwright[3], Nathan Waltham[3], Adam Rose[1], Kalpana Pudasaini[1], Tania Skewis[1]

[1]Central Queensland University, Rockhampton, Australia. [2]Charles Darwin University, Darwin, Australia. [3]James Cook University, Townsville, Australia

Keywords:

14. Environmental Economics

31. Water

Paper Abstract:

The importance of water security to the development of northern Australia is well recognised. Major water storage infrastructure plays a significant role in advancing food and drinking water security, particularly in seasonally dry climates. However, large in-water structures such as dams and weirs have the potential to impact on water quality and aquatic ecosystems, including endangered species. Environmental monitoring programs aim to measure these impacts so that they can be better managed, underpinning a sustainable approach to water security.

The recent construction of Rookwood weir in the Fitzroy River, central Queensland, provides an example of a new water supply infrastructure project approved and completed in northern Australia to supply industrial and agricultural water. Along with other environmental requirements, the development and implementation of a comprehensive water quality monitoring program was a condition of the Australian Government approval for the Rookwood weir project. To meet this requirement, a wide range of water quality parameters are regularly monitored upstream, within and downstream of the impoundment area. This is currently being achieved by the proponent, primarily through manual monitoring and sample collection by contracted consultants.

In regional and remote areas, the long travel times to sampling sites and freighting samples for laboratory analysis result in higher monitoring costs than in urban centres. There are health and safety issues associated with manual water sampling during flood events in large rivers like the Fitzroy, but remote sites often have no electricity supplies and limited to no telecommunications, making automated monitoring options logistically difficult to implement. These monitoring challenges are common across northern Australia, as evidenced in three

other case study regions in different stages of water supply development: the Gilbert River in far north Queensland, the Daly River in the Northern Territory (NT), and the Keep River which straddles Western Australia and the NT within the Ord River Irrigation Area.

As part of the CRCNA Water Security for Northern Australia (WSNA) research program, we are investigating a range of options to optimise water quality monitoring for water storages in rural and regional areas. The difficulty of monitoring in these regions has implications for the ongoing costs of water supplies in the north. Ultimately, these monitoring costs will need to be either covered by suppliers or governments, or passed on to water users, including irrigators. There is a need to streamline environmental monitoring methods to retain scientific rigour and meet government approvals, while improving cost efficiency.

In this presentation, we compare current water quality monitoring programs across northern Australia, and discuss more efficient monitoring options across four case study river regions. We explore the potential economic risks, as well as the opportunities for northern Australia to drive a new strategy for effective water quality monitoring, management and governance.

Farm-level data to sustainability: Australian growers' perspective

Bhola Paudel[1], Shyh Wei Teng[1], Shoaib Riaz[1], Ramachandra Rao Kolluri[2], Harpinder Sandhu[1]

[1]Federation University, Ballarat, Australia. [2]IBM Consulting, Melbourne, Australia

Keywords:

1. Agribusiness

4. Agricultural Technology and Innovation

5. Biodiversity

15. Farm Management and Farmer Behaviour

19. Impact Assessment

Paper Abstract:

With growing global interest in sustainable agriculture and ESG frameworks, a gap remains in the literature regarding how farmers themselves perceive and apply these concepts. To address this, an online survey of Australian farmers was conducted, examining four related areas: sustainable agricultural, ESG, smart-farm technologies, and farm data utilization. The objective was to explore ways to integrate smart-farm data into ESG assessment tools to evaluate sustainability. The survey results indicate that Australian farmers view sustainability primarily as an ethical responsibility handed down through generations, rather than as a set of technical measures. In contrast, ESG is largely unrecognized or regarded as tools used by corporates. This suggests that acceptance depends on collaboratively developing tools that speak farmers' language and respect their existing knowledge systems. Although 40 percent of respondents reported using at least one smart farming technology, barriers such as poor connectivity, high costs, and software usability issues impede broader adoption. Most farmers still rely on

manually managed records and lack an integrated, offline-capable platform that can convert raw data into actionable insights while preserving autonomy and reliability. These findings highlighted the need for a farmer-centric ESG assessment framework that combines quantitative data streams with qualitative expertise.

Agtech for Transformation of Australian Agriculture: Digital Twins to Manage Natural Resources, Enhance Productivity and Sustainability

Volker Hessel[1], Shu Liang[1], Long Nguyen[1], Mst Irin Parvin[1], Bhola Paudel[2], Pramod Gautam[2], Kashif Khaqan[2], Harpinder Sandhu[2]

[1]Adelaide University, Adelaide, Australia. [2]Federation University Australia, Ararat, Australia

Keywords:

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

Paper Abstract:

The global agtech industry is currently worth $700 billion, and the digital transformation of Australian agriculture can potentially add $20 billion annually to its production value and $300 billion over the next decade, driven by the adoption of digital innovations. The agricultural industry is undergoing a transformation through the integration of the Internet of Things (IoT), artificial intelligence (AI), and machine learning (ML), enabling farmers to make data-driven decisions on crop management, irrigation, and resource utilisation. ML processes sensor data to predict yields, control pests, and optimise harvests. IoT enables real-time field communication. Based on these innovative technologies, a state-of-the-art digital twin (DT) has the potential to enhance decision-making and further improve productivity and sustainability, supporting efficient resource use and climate resilience throughout the agricultural value chain. A digital twin (DT) is a virtual model of a physical entity, such as a farm or vineyard, that reflects its real-world behaviour. While DTs are widely used across other industries, their adoption in agriculture is limited. As farming embraces digital transformation, DTs offer untapped potential for improving productivity and sustainability.

Here, we showcase DTs for a canola farm located in the Ararat region (Victoria) and a vineyard in the McLaren Vale region (South Australia) by integrating these technologies. These DTs take sensing data gathered at real-world farming environments, model these, and provide agentic decision-making support, enabling farmers and grape growers to test farming scenarios and decisions in a virtual space before implementation and, importantly and ongoingly (real-time), during real plant growth on a farm field. The presentation will include the development of DTs and highlight early results on improved decision-making using an own-designed Multi-Agent Generative System (MAGS) to manage pests, diseases and plant growth. We will share our findings on how innovative technologies are empowering farmers to manage resources sustainably and enhance productivity and sustainability. It will also reflect on how such innovations can add value to the local and national economy.

Value Addition to Agricultural Products in Australia: Key Drivers and Barriers

Thuy Van Dao, Harpinder Sandhu, Shoaib Riaz

Federation University, Ballarat, Australia

Keywords:

1. Agribusiness

15. Farm Management and Farmer Behaviour

Paper Abstract:

Value addition to agricultural products is a key strategy for enhancing farm profitability, stimulating local economic growth, and supporting sustainable regional development. This research investigates the perceptions, motivations, and constraints faced by farmers in rural Australia when adding value to their agricultural products.

The study used a mixed-methods approach, and an online survey was conducted with 108 farmers in Australia. Findings indicate that a significant majority view value addition as important, with 70% rating it as “very” or “extremely” important. Key motivations include increased profitability (73.5%), income diversification (46.9%), and capturing more value within the supply chain (51%).

However, several barriers hinder value-addition efforts. These include high production costs, regulatory complexity, limited infrastructure access, and difficulties securing finance-particularly due to high interest rates and stringent lending requirements. Challenges in accessing value-adding technology were also reported, with cost-effectiveness, technical reliability, and access to training identified as key factors influencing this access. A preliminary binary logistic regression model was tested to explore the relationship between demographic factors and value-adding decisions of farmers. The study provides practical insights for policymakers and rural development agencies aiming to support innovation and competitiveness in the agricultural sector.

Transforming Agriculture: Managing Increasing Uncertainty

David Adamson

Adelaide Unversity, Adelaide, Australia

Keywords:

4. Agricultural Technology and Innovation

28. Uncertainty and Risk

Paper Abstract:

Australian agriculture has always been transforming. New markets, new commodities, new policies and regulations, biosecurity events and a highly volatile land of droughts and floods

have necessitated transformation. Transformation comes at a cost and takes time to pay back the capital investment. When the system is known and time is available, transformation is possible and profitable. But the systems we know are breaking, and time is not on our side. Transformation failure leads to the irreversible loss of capital (economic, natural, social and cultural).

Climate change is rapidly altering the biophysical pressures on production systems (increased heat stress, changes in rainfall, changes in the distribution and density of agricultural pests). Trade rules and deals have been shredded overnight, and a new order is emerging. Social license issues are driving private regulations at rates faster than government regulations, and posing risks for early adopters (e.g. avian influenza and free-range production). Water, Australia's most valuable input, is becoming more volatile in its supply, and it has exposed current capital investors who failed to appreciate the inherent uncertainty in water rights. While biosecurity events can shut down export markets overnight, and lead to the destruction of capital. These factors, along with others, introduce uncertainty that can lead to transformation failure, wasted resources, and pose risks to global food security.

This paper develops a new method for representing uncertainty in transformation models and explores key identified uncertainties, highlighting where and why systems can break. The new method draws from systems thinking, joint-production functions, the state-contingent approach to risk and uncertainty, and accounts for capital loss in production systems that have production maturity delay (i.e. loss of heavy animals and/or perennial rootstock).

An example will be provided.

Parallel Session: Food Systems & Loss

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R6B

Chair: Thilak Mallawaarachchi

Hidden Burdens of Typhoon Yagi: Rural Food Security in Myanmar

Yiyi Zhao[1], Sonia Akter[1], Salauddin Tauseef[2], Bart Minten[2]

[1]Australian National University, Canberra, Australia. [2]International Food Policy Research Institute, Vientiane, Lao, People's Democratic Republic

Keywords:

8. Climate Change

17. Food, Health and Nutrition

Paper Abstract:

In September 2024, Typhoon Yagi, the strongest cyclone to strike Myanmar in over a decade, brought torrential rainfall and flooding that inundated seven of the country's 14 states and regions, displaced more than two million people, and damaged critical transportation and agricultural infrastructure. Despite the scale of the disaster, rigorous evidence on its immediate effects on household welfare remains scarce, especially for rural and economically vulnerable communities. This study provides early empirical estimates of the short-term socio-economic impacts of the Yagi floods, with a focus on household food security and reliance on subsistence production.

We use the Myanmar Household Welfare Survey (MHWS), a nationally representative phone survey that collects sex-disaggregated information on income, consumption, and food security. The MHWS is a rare data source in a conflict-affected setting where conventional fieldwork is often impossible, offering a unique opportunity to assess disaster impacts. For this analysis, we selected three survey waves: two pre-disaster rounds as baseline (October 2022 and August 2023) and one post-disaster round conducted within three weeks of Yagi's landfall in September 2024. To identify causal effects, we restrict the sample to flood-affected states and exploit township-level variation in flood intensity, applying a difference-in-differences design to compare changes in household outcomes across areas experiencing mild, moderate, and severe inundation.

Results show a non-linear relationship between flood intensity and food insecurity. Households in moderately flooded areas (level 3 on a five-point scale) were 7 to 9 percentage points more likely to report food insecurity after the typhoon, relative to pre-disaster baselines and to households in lightly affected areas. Mild (level 2) and severe flooding (levels 4 and 5) had no statistically significant effect on food insecurity indicators. A plausible mechanism is that moderate flooding disrupted agricultural and casual-wage livelihoods enough to heighten food

insecurity, whereas severe floods triggered larger-scale humanitarian relief or prompted displacement that temporarily buffered households from immediate shortages. Households in the most severely flooded townships also reported a significant decline in own-farm consumption, suggesting damage to standing crops and interruptions in self-provisioning.

The findings underscore the need for a disaster response that goes beyond visible property and infrastructure damage to address hidden impacts on food security and rural livelihoods. Recovery strategies should be adaptive and sensitive to local flood intensity, strengthening links between agricultural production, subsistence consumption, and food access. Targeted early measures such as emergency food or cash assistance are especially important in moderately affected areas where formal relief may be limited but livelihood disruptions are severe.

Estimating the gross domestic product losses due to externalities of the Australian food system

Fentahun Abebe[1], Maartje Sevenster[2], Cecile Godde[1], Peggy Schrobback[1], Javier Navarro Garcia[1]

[1]CSIRO, Brisbane, Australia. [2]CSIRO, Canberra, Australia

Keywords:

14. Environmental Economics

17. Food, Health and Nutrition

Paper Abstract:

Australia produces a large range of agricultural commodities such as livestock, horticulture, grains, and fibre. Agriculture and food sectors' value added to the Australian GDP was approximately 168 billion dollars. However, production, distribution and consumption of agricultural commodities generate environmental, social and health external costs. External costs occur when the action of one economic agent has uncounted effect on other parties who do not directly engage in the economic activities or transactions. A few studies of global scope have estimated the external cost of Australia's food system in monetary terms using global datasets. However, these studies didn't consider detailed characteristics of the Australian food system in terms of climatic conditions, geography, land use, and agricultural practices (e.g., fertiliser use, livestock stocking rate). By combining different datasets specific to Australian contexts and the Shadow Prices of Impact Quantities for Food Systems marginal cost model (SPIQ-FS), this research aims to improve existing external cost estimates for the Australian food system by finetuning impact quantity data where possible. Our analysis provides a refined external cost estimate. These costs adversely affect food systems' potential to deliver ecologically sustainable, economically efficient and affordable, socially just, and healthy food. The findings of this study offer a quantification of external costs and an indication of market failure. Policy recommendations of how the government could address these external costs are provided and discussed, e.g., taxes and subsidies, awareness creation, and educational campaigns, among others.

Quantifying the Sustainability Gains from Reducing Food Loss and Waste in India

Sowmiyaa Subramaniam, Ankit Saha, Ranjan Kumar Ghosh

Indian Institute of Management Ahemedabad, Ahmedabad, India

Keywords:

8. Climate Change

17. Food, Health and Nutrition

Paper Abstract:

India's net-zero target for 2070 requires action across sectors, including the food system, a major source of greenhouse gas (GHG) emissions and a key area for climate mitigation. Within the food system, one of the most overlooked aspects is Food Loss and Waste (FLW), which has far-reaching environmental, economic, and nutritional implications. While studies on a global scale have attempted to evaluate the implications of FLW reduction for climate, land, and food security outcomes, FLW research in India remains largely fragmented and limited. The cross-sectoral impacts of FLW, such as reduced pressure on land and contributions to mitigation targets, have been largely underexplored.

This study addresses that gap by quantifying the benefits of reducing FLW in India using an adapted version of the FABLE (Food, Agriculture, Biodiversity, Land Use, and Energy) Calculator, an open-source, Excel-based model developed by the FABLE Consortium and implemented in 21 countries. With food demand as the main driver of land-use change, it captures linkages across agricultural production, water use, biodiversity, and emissions. Modifications included adding post-harvest stages, expanding to an additional three product groups (eggs, sugar, beverages, and spices), and replacing FAO's regional data with India-specific FLW ratios. Three pathways were analyzed: (a) Current Trends (business-as-usual); (b) National Commitments (India's stated targets); and (c) Global Sustainability (aligned with global best practices). To gauge the nutritional implications, food saved through FLW reduction was converted into potential recoverable calories and protein, estimating the number of individuals whose daily dietary needs could be met.

The results show consistent system-wide gains from reducing FLW across all pathways. In cross-pathway comparisons, halving FLW by 2050 reduces cropland demand by 31% and GHG emissions by 32% under the National Commitments pathway (relative to current trends). Under the Global Sustainability pathway, the reductions are even higher, at about 36% for cropland and 43% for emissions. The marginal effects of FLW reduction within each pathway are also evident. Under National Commitments, emissions decline by 4.5% at a 30% reduction and 8.5% at a 50% reduction. These results show both the amplified impact of combining FLW reduction with broader policy efforts and the benefits of FLW reduction even without changes to existing targets. Nutritionally, halving FLW by 2030 could meet the daily energy needs of ~42 million people (2,000 kcal/capita) and the protein needs of ~49.5 million (50g/capita), covering ~20% of India's undernourished population.

This study presents evidence on the potential benefits from reduction in FLW at the national level. By demonstrating the co-benefits across sectors (food, agriculture, and environment), this

study contributes to the discussion on strategies towards the reduction of FLW across the food value chain from production to consumption. It adds evidence to a largely overlooked area and highlights the need to integrate FLW management into broader national sustainability strategies.

Monitoring for Better Business: Enabling Integration of Food Waste Data in QSR Operations

Asgiri Jayasekara[1], Sarah Wheeler[2], Olena Kravchuk[1], Helen Morris[1]

[1]Adelaide University, Adelaide, Australia. [2]Flinders University, Bedford Park, Australia

Keywords:

17. Food, Health and Nutrition

27. Productivity and Efficiency

Paper Abstract:

The Australian foodservice sectors contribute significantly to national food waste, accounting for approximately 19% of the total, with the hospitality subsector responsible for an estimated16%. Of the 1,217 thousand tonnes generated annually by hospitality foodservice, around 68% is sent to landfill, making it the second-largest contributor to landfill waste after households. Within hospitality, Quick Service Restaurants (QSRs) are reported to be the largest contributors, yet quantitative data remains limited and of low quality. Menu design and operational practices may influence the amount and stage of food waste generation, with notable variation across foodservice establishment types.

The study addresses a critical gap: the lack of practical, cost-effective tools for small foodservice businesses, particularly QSRs, to independently audit and manage pre-consumer food waste. While camera-bin technologies offer automated solutions, these are typically suited to larger foodservice operations due to cost and infrastructure requirements. Existing manual tools, often provided by local councils, primarily target household food waste and offer general guidance on kitchen waste minimisation, home-composting, and guidance on council bin usage. However, they lack detailed methodologies for quantifying food waste, hotspot identification, and interpreting findings. This gap may contribute to low audit engagement, with only 23% of Australian foodservice businesses reported to regularly audit their food waste. Without reliable measurement frameworks, businesses struggle to understand the volume, location, and drivers of food waste, hindering effective interventions.

This study aimed to develop a practical, low-cost manual audit framework for small foodservice businesses, specifically QSRs, to quantify and monitor pre-consumer food waste, using Statistical Process Control (SPC) to identify waste hotspots and guide adaptive sampling strategies.

SPC offers a promising analytical approach for monitoring food waste generation over time. It uses control charts to distinguish between common cause variation (normal fluctuations) and special cause variation (unexpected spikes due to external factors). By mapping food waste as a process output influenced by ordering, preparation, and service, SPC enables identification of

trends, anomalies, and waste hotspots. This time-sensitive framework supports adaptive sampling schedules and evidence-based operational adjustments, enhancing audit reliability and waste reduction efforts.

The study involved collaboration with QSRs located in a university campus and a central mall food court in Adelaide, South Australia. A four-stage methodology was employed: recruitment and information sessions with QSR managers; daily food waste audits using a manual system for separating, collecting, and measuring waste at negotiated intervals; observation of foodservice and menu practices during the audit period; and semi-structured interviews with QSR managers to explore operational practices influencing food waste generation and disposal. Data from audits, observations, and interviews were analysed to identify patterns and inform adaptive sampling protocols.

Preliminary analysis revealed variability in food waste generation across categories and days, with SPC charts indicating multiple instances of special cause variation. These findings suggest a degree of instability in waste processes and highlight the value of SPC in identifying actionable insights. The study demonstrates the feasibility of manual audit tools and SPC analysis for small foodservice businesses, offering a scalable framework to improve waste monitoring and support targeted interventions.

State-Contingent Approaches to Food System Transformation: Rethinking Food Loss Metrics

Thilak Mallawaarachchi[1,2], Nauman Ejaz[3]

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Keywords:

17. Food, Health and Nutrition

23. Market Design and Policy

Paper Abstract: Global food systems face the dual challenge of meeting rising demand while adapting to expectations for environmental integrity, food safety, and nutrition. These requirements are particularly difficult in horticultural systems where perishability, diverse agro-ecological conditions, and fragmented value chains amplify coordination failures. Current policy discourse frames food loss as a volumetric inefficiency, overlooking the opportunity costs of quality degradation and missed market returns. For instance, a mango failing export-grade standards due to poor handling represents not only physical loss but also foregone value. By focusing narrowly on quantity-based metrics, prevailing approaches divert attention from systemic constraints—such as lack of traceability, weak institutional capacity, and limited adaptive options—that shape both losses and unrealised opportunities. This paper argues that a state-contingent approach, advanced since Chambers and Quiggin (2000), offers a more comprehensive framework in better capturing principal-agent problems underlying key public policy issues surrounding food system transformation. Drawing on South Asian and Australian case studies, we propose strategies that integrate state-contingent claims, product differentiation, and investment responsibility to transform food loss metrics and policy.

Parallel Session: Food & Choices

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R8

Chair: Emilio Morales

Consumer Behavior and Food Waste: The Decision to Discard Day-Old Bread in Indonesia

I Gede Agus Ariutama[1], Ram Pandit[1,2,3], Benedict White[1], Maksym Polyakov[1,4]

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Keywords:

9. Consumer Choice

17. Food, Health and Nutrition

Paper Abstract:

This study uses a vignette methodology to examine the decision by Indonesian consumers to discard bread that is just past its use-by date. We investigated consumers' decisions to discard slightly past use-by-date bread by analyzing economic, sociodemographic, and food management factors. Survey data from 391 respondents (within-subject design) and 1049 respondents (between-subject design) in Yogyakarta and Bali provinces were analyzed using mixed-effect and standard ordered logistic regressions. Our results revealed that bread condition was the primary determinant of consuming bread that had passed its use-by-date, with the effect being particularly stronger in Bali compared to Yogyakarta. Sociodemographic aspects further moderated these patterns. Individuals with income above the poverty line and those having children were more likely to discard bread, although this behavior reversed when the bread was unspoiled, implying confidence in food assessment skill and parental concern. Behavioral moderators added further nuance. For example, frequent label checkers were prone to consuming expensive use-by-date expired bread, but also avoided consuming unspoiled bread when risk is indicated in the date labels. This suggests a reliance on label information over sensory evaluation. Proficient preservation skills were associated with a greater willingness to consume unspoiled bread. Together, these findings underscore the interplay between safety perception, economic considerations, and individual preferences in shaping bread discarding behavior. Policy interventions targeting clearer date labeling, awareness of sensory cues, and tailored messages for sociodemographic groups could contribute to reducing bread waste at home.

Gender, Technology, and Food Security: Mobile Phone Access in Rural Bangladesh

MOST NILUFA KHATUN[1,2], Md Sayed Iftekhar[1], Athula Naranpanawa[1]

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Keywords:

10. Development Economics

17. Food, Health and Nutrition

Paper Abstract:

Despite growing interest in digital inclusion and food security, limited empirical research has addressed the intra-household gendered dimensions of mobile phone ownership and its implications for household food security. This study addresses this gap by examining whether mobile phone ownership among female versus male household members affects food security outcomes in rural Bangladesh. Employing correlated random effect (CRE) and fixed effect (FE) estimations with three rounds of panel data (year 2012, 2015 and 2018) from the Bangladesh Integrated Household Survey (BIHS), this study assesses the impact of gender-disaggregated mobile phone ownership on two widely used proxies of food security: the Household Dietary Diversity Score (HDDS) and the Food Consumption Score (FCS). Findings reveal that female mobile phone ownership significantly contributes to improving both HDDS and FCS, and this effect is magnified in female-headed households. In contrast, male ownership yields positive but statistically insignificant effects. These findings highlight the importance of intra-household gender dynamics in the returns to digital technology adoption. Implementing policies that promote gender-inclusive digital literacy and expand mobile-based agricultural and nutritional services for women is essential to enhancing household food security.

Microgreens at Home: Exploring Women's Role in Integrating Microgreens into Household Diets through Social Cognitive Perspective

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Keywords:

1. Agribusiness

17. Food, Health and Nutrition

Paper Abstract:

Global food and nutrition insecurity has intensified in recent years, with the triple burden of malnutrition—undernutrition, micronutrient deficiencies, and overnutrition—now affecting many populations simultaneously. Indonesia, as the world's fourth most populous country, is experiencing this crisis acutely. The 2024 Indonesian Nutrition Status Survey reports that 15.6% of the population is stunted, 13.9% are underweight, and 3.4% are overweight, while

widespread micronutrient deficiencies persist. Within this context, women play a central role as the primary agents of food preparation and dietary decisions at the household level, making their knowledge, choices and agency critical in shaping pathways toward food and nutrition security.

Microgreens—young edible greens harvested at the first true leaf stage—have gained attention for their high nutrient density and minimal input requirements. Compared to sprouts, baby greens and mature vegetables, they offer a higher concentration of vitamins and antioxidants. These characteristics position microgreens as promising candidates in promoting food and nutrition security while also align with the objectives of the FAO's Future Smart Food (FSF) initiative, which promotes crops that are nutritionally dense, climate-resilient, economically viable and locally adaptable. Although FSF primarily targets neglected and underutilised species (NUS), it does not exclude crops by growth stage. Since microgreens can be cultivated from both NUS and conventional species, they present a unique opportunity to function as FSF. Despite this promise, given its novelty, research on microgreens in Indonesia remains limited, particularly regarding household integration.

Guided by Social Cognitive Theory, this study investigates how women's knowledge, perceptions, and household roles influence their likelihood of integrating microgreens into daily diets. Data were collected in August 2025 from urban and peri-urban areas of West Java, Indonesia. The study employs a Participatory Dietary Recall Activity (PDRA) embedded within the national "*Isi Piringku*" ("what's on my plate") dietary diversification program, which involves 20 women. This method captures the dietary patterns and assesses women's food and nutrition knowledge. Follow-up in-depth interviews with 10 women further explored the perception of microgreens, incorporating heuristic cues and assessing levels of food neophobia.

Preliminary findings indicate differing levels of food and nutrition knowledge between urban and peri-urban women, which in turn shape their perceptions of microgreens and influence their likelihood of integrating them into daily diets differently. These insights reveal potential entry points for promoting microgreens within a nutrition-sensitive food system. While further empirical research is needed, the study highlights the promise of microgreens in supporting dietary diversification and resilience.

Inequalities in Access to Good-Quality Drinking Water in Remote and Regional Australia

Thi Ha Lien Le[1], Nhat-Mai Nguyen[1], Long Chu[1], Paul R. Wyrwoll[2], R. Quentin Grafton[1]

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Keywords:

17. Food, Health and Nutrition

31. Water

Paper Abstract:

Water security is closely linked to food security, making the quality of drinking water – in terms of both health safety and aesthetic acceptability – crucial for sustainable human well-being. Good-quality drinking water is essential for drinking, supports food preparation, influences diet quality, reduces risks of foodborne and waterborne illness, and is important for other domestic uses such as bathing, which can have long-term impacts on health and quality of life. Yet access to safe and acceptable drinking water remains inequitable across and within countries.

We investigated inequalities in access to 'good-quality' drinking water, defined as water fully compliant with both health-based and acceptability-based Australian Drinking Water Guidelines, across four Australian jurisdictions: the Northern Territory, South Australia, Victoria, and Western Australia. We compiled drinking water quality data from public reporting by large state-owned water corporations for communities with populations under 10,000 between 2016 and 2023, a scale of coverage that is uncommon in existing research. We then integrated socio-economic data to create a panel dataset, enabling the examination of both underlying and proximate factors, such as geographic remoteness, First Peoples status, population size, and levels of socio-economic advantage, on the likelihood and duration of communities having access to good-quality drinking water. A range of econometric and statistical methods, including logistic regression, were used to explore significant associations while controlling for factors such as water source and rainfall conditions. These new data-driven perspectives contribute to the current literature, which has been primarily based on qualitative studies.

Our results show that health-based compliance is generally high across communities, yet disparities persist in access to overall good-quality drinking water and to water compliant with acceptability-based guidelines, particularly among communities with smaller populations, more remote locations, lower socio-economic status, First Peoples, and those reliant on groundwater. These communities experience both a longer duration and a higher likelihood of not accessing good-quality drinking water. The results are robust to different specifications and tests. Inequalities in access to good-quality drinking water stem from a combination of environmental, socio-economic, and historical factors, including gaps in policy and governance, limited monitoring and reporting of water quality data, the enduring impacts of colonisation, and insufficient investment in infrastructure for communities with small populations and those in remote areas.

The paper highlights the urgent need for targeted infrastructure funding, governance reforms, and community partnerships to ensure universal and equitable access to good-quality drinking water. Achieving this requires not only improving physical water-supply infrastructure. It also involves adopting community-supported governance models, including initiatives led by Indigenous Elders that respect and amplify the voices of those most affected, for instance through experiential surveys of water and food insecurity. It further entails integrating different forms of knowledge, such as Indigenous cultural understanding of place, drawing on expertise like traditional ecological knowledge of water sources, and applying a ‘whole-of-system’ approach that is fit for purpose, people, and place. Such approaches offer better ways to deliver improved water services to all Australians.

Consumers and Their Companions: Psychographic Segmentation, Attribute Preferences and Dog Food Purchase Behaviour in Peru

Angie Higuchi[1], Luis Emilio Morales[2], Luz de los Angeles Sanchez Perez[1], Bruno Luiz Americo[1]

[1]Pontifical Catholic University of Peru, Lima, Peru. [2]University of New England, Armidale, Australia

Keywords:

9. Consumer Choice

17. Food, Health and Nutrition

Paper Abstract:

The rapid growth of the pet food industry has been driven by the humanisation of pets and the increasing importance of nutrition, quality, and health-related attributes in consumer decisions. This study examines the relationship between dog–owner bonds, food attribute preferences, and food purchasing behaviour. Using survey data from 189 dog owners in Modern Metropolitan Lima, we applied factor and cluster analyses to identify psychographic segments and compare their purchasing criteria. The two distinct groups that emerged are “dog parents”, who exhibit high levels of anthropomorphism and prioritise health, nutrition, freshness, variety, and palatability; and “pet owners”, who value these attributes but to a significantly lesser degree and remain more price sensitive, although brand loyalty and value packaging are relevant. Veterinarian recommendations were influential across both groups, while advertising and social media played a minor role. Importantly, results highlight that personal values and the depth of the dog–owner relationship are more predictive of pet food choices than demographic characteristics. These findings contribute to the growing literature on pet food consumer behaviour by demonstrating the strategic importance of psychographic segmentation. For industry stakeholders, the results suggest opportunities to differentiate products and marketing strategies by targeting “dog parents” with premium, health-oriented options, while engaging “pet owners” through affordability and convenience.

Parallel Session: Agricultural Management

10:30 - 12:10 Wednesday, 11th February, 2026

P Riverbank R8B

Chair: Panharoth Chhay

Constructing a Plot-Level Database of Geographical or Physical Disadvantages

Yuya Katafuchi[1,2], Yoshitaka Miyake[3], Takeru Kusudo[4,3]

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Keywords:

15. Farm Management and Farmer Behaviour

21. Land and Natural Resource Management

Paper Abstract:

One of the important issues in agricultural policy under an aging society is how to sustain farming in disadvantaged areas facing high production costs, land abandonment, and shrinking community functions. One key tool is direct payment programs that provide support based on geographical or physical conditions.

In Japan, hilly and mountainous land is widespread, and these issues are severe. Moreover, aging and depopulation make farming increasingly difficult. Accordingly, the Direct Payment System for Hilly and Mountainous Areas (DPS), introduced in 2000, supports farmers in geographically disadvantaged areas. This program aims to maintain not only food production but also other multifunctional roles. DPS defines eligibility mainly by slope, with different criteria for rice paddies and upland fields. Although annual contracted areas are reported, there is limited information on the locations of eligible farmland and the extent of program coverage. Previous studies at the community or household level showed positive effects but could not capture the national distribution of eligible land or identify the gap between eligibility and participation.

The main problem is the lack of consistent and exhaustive plot-level data on geographical disadvantage. Without such data, the targeting and evaluation of DPS remain limited and biased.

Here, we show that a GIS method linking plot-level farmland polygons with 10 m-mesh slope raster data can create a national plot-level database aligned with DPS criteria. We use nine slope measures combining three mesh statistics (minimum, average, maximum) with three aggregation methods (minimum, area-weighted average, maximum). This framework allows

comparison of classification outcomes under different methods. Using the conservative "min-ave" approach, we estimate that only 0.11% of upland field area is "super-steep," 0.20% "steep," and 1.62% "moderately steep." For rice paddies, the shares are higher at 1.30%, 4.37%, and 28.88%, respectively. Alternative methods, such as "ave-ave," classify larger areas, showing how methodological choices affect results.

The findings indicate that rice paddies, more than upland fields, are classified as eligible according to the steepness criteria. This also corresponds to higher DPS participation in steep paddy areas. Our approach provides an exhaustive dataset enabling more precise and unbiased estimates, important because eligibility decisions influence fund allocation and whether small, aging communities can continue farming.

In a broader context, our study contributes to international discussions on targeting support in agricultural policy. The European Union's Areas with Natural Constraints scheme offers a parallel, and our case shows how open, verifiable plot-level data can refine eligibility and improve policy accuracy. The released dataset includes about 30 million farmland polygons with slope measures and summaries at several administrative levels. This resource enables analysis of eligibility, participation, and socio-economic factors by researchers, administrators, and communities.

In conclusion, integrating plot and slope data allows visualization of policy criteria on actual maps and production of quantitative statistics for analysis. Our results highlight how technical choices in slope calculation influence estimates of eligible farmland. We hope that open, reproducible data can improve the governance of disadvantaged farming areas at national and global scales.

Infrastructure Investment Costs and the Adoption of Low-Water, Low-Emission Farming Techniques in Vietnam: An Economic Analysis

Nhat Mai Nguyen[1], Thi Ha Lien Le[1], R. Quentin Grafton[1], Quoc Anh Ho[1], Thang Do[1], Khoi Dang[2], Long Chu[1]

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Keywords:

3. Agricultural Production

7. Carbon and Nature Markets

Paper Abstract:

Excessive water use in rice production is a major source of methane emissions—the dominant greenhouse gas from Vietnam's agricultural sector. Improving water-use efficiency can enhance water security and reduce emissions; however, such improvements require significant changes in farming practices and substantial investment in supporting infrastructure. This study provides an economic analysis of infrastructure investment costs associated with the adoption of low-water, low-emission (LWLE) farming techniques in Vietnam. Using survey data from

14,312 rice-producing households in 2022 and applying a cost–benefit framework, the study estimates the scale of capital investment required to enable widespread LWLE adoption. The results show that LWLE adoption involves considerable upfront costs for irrigation infrastructure, posing a major barrier for farmers. Adoption rates decline sharply as infrastructure costs rise, underscoring the need for targeted financial and policy interventions to overcome these barriers. The findings suggest that without complementary investments in irrigation systems or adequate financial support, carbon pricing alone may inadvertently penalize farmers in regions with limited infrastructure. Overall, the study highlights that the successful scaling of LWLE as a climate-smart agricultural practice in Vietnam depends critically on addressing infrastructure investment constraints.

Assesing Soybean Production Efficiency: Do Frontier Functional Forms and Distributional Assumption Matter?

Susanti Evie Sulistiowati, Nuhfil Hanani, Hery Toiba, Fahriyah Fahriyah, Moh Shadiqur Rahman

Univeritas Brawijaya, Malang, Indonesia

Keywords:

3. Agricultural Production

12. Econometric Modelling

Paper Abstract:

Understanding the true efficiency of agricultural production depends on selecting an appropriate functional form and distributional assumption in efficiency analysis. This study aims to evaluate how different production frontier specifications and inefficiency distributions affect the estimated technical efficiency of soybean farmers in East Java, Indonesia. Using survey data from 110 farmers, three production frontiers—Cobb–Douglas, Constant Elasticity of Substitution (CES), and Translog—were compared under two common inefficiency distributions, half-normal and truncated-normal. The findings show that mean efficiency estimates differ across models: the Cobb–Douglas model produces the lowest values (0.60–0.66), the CES model yields moderate results (0.67–0.70), and the Translog model provides the highest estimates (0.72–0.77). The truncated-normal distribution captures heterogeneity among farmers more effectively than the half-normal. Model comparison results indicate that the Translog–truncated-normal specification is the most reliable for representing soybean production efficiency. Overall, farmers operate about 23–28% below their potential production frontier. The study highlights the importance of model selection in efficiency analysis and suggests that improving input management, farmer training, and the adoption of high-yield seed varieties are critical to enhancing productivity and strengthening Indonesia's soybean sector.

Risk Mitigation in Environmental Conservation for Potato Production in Cisangkuy Sub-Watershed, Bandung Regency, West Java, Indonesia

Nur Syamsiyah, Sara Ratna Qanti, Dini Rochdiani

Universitas Padjadjaran, West Java, Indonesia

Keywords:

1. Agribusiness

3. Agricultural Production

Paper Abstract:

Potatoes are a crop that thrives in highland areas, and Bandung Regency is one of the major potato production centers in West Java. This production center is located in an environmentally focused village development area within the Cisangkuy Sub-Watershed of Bandung Regency. The purpose of this study is to identify risks arising from various risk sources and to formulate risk control strategies for potato production in this region. The method used is the house of risk (HOR) method. In farming activities, farmers must comply with environmental regulations. However, many farmers are still unaware of the importance of environmental sustainability, particularly in their use of chemicals. To actively engage in environmental management efforts, it is crucial to understand the characteristics of potato farmers in Bandung Regency, especially those located in the development area of environmentally focused villages within the Cisangkuy Sub-Watershed. The results of this study identified 33 risk events. The risk event with the highest impact is waterlogged plants (E10), with an impact value of 8.9. Based on the Pareto diagram, 16 priority risk sources need to be addressed. The most significant risk source identified is the use of uncertified seeds (A29). To mitigate risks in potato production, 21 preventive actions (PAs) have been proposed. One of the most effective strategies is for farmers to purchase seed potatoes directly from Balitsa (PA1), with an effectiveness ratio (ETD) of 4372. Another recommended strategy is to purchase certified seeds from other breeders (PA2). These strategies are prioritized to reduce the risks faced by potato farmers.

Do Digital Financial Services Promote Agricultural Input Use? Evidence from Rural Cambodia

Panharoth Chhay[1], Alexandra Peralta[1], Rida Akzar[1], Rido Thath[2], Vibol San[2], Vin Spoann[2]

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Keywords:

2. Agricultural Finance

4. Agricultural Technology and Innovation

Paper Abstract:

Use of productivity-enhancing agricultural inputs remains low across rural areas of developing countries. The literature highlights access to credit as key to financing such inputs. Digital financial services (DFS)—which provides credit, secure savings, and channels for sending and receiving money—have emerged as a promising tool to expand financial access. DFS can facilitate input purchases by offering credit and savings options and by enabling remittances. By

improving financial inclusion and lowering transaction costs, DFS make it easier for remote farmers to access the financial services needed to invest in productivity-enhancing inputs and to receive remittances from family members.

Despite its promise, evidence on DFS effectiveness in improving access to resources for financing agricultural inputs remains limited. Most studies have examined traditional credit (non-digital or informal) and rural nonfarm employment as input financing sources, or focused on remittances for consumption smoothing and shock protection rather than as a direct source of agricultural investment.

This paper investigates the role of DFS in financing agricultural inputs in rural Cambodia. We examine both the direct effects of DFS adoption on input use and its facilitating role along three potential financing channels—remittances, credit, and nonfarm employment. We also analyse widely used over-the-counter (OTC) financial services as a distinct non-digital category. To address selection into DFS or OTC use, we employed the Inverse Probability Weighted Regression Adjustment (IPWRA) and control for a broad set of socio-economic, infrastructural, and institutional characteristics.

We conducted our research in Cambodia, amid rapid growth and rising internet penetration, utilizing a comprehensive DFS dataset covering 1,000 households in Battambang, Kampong Cham, and Kandal—provinces characterised by high agricultural commercialisation, export-market access, proximity to urban centres, and infrastructure that supports DFS.

Preliminary results suggest that DFS adoption has selective direct effects: relative to nonusers, DFS users are more likely to adopt improved variety seeds and spend more on seed, pesticides, and insurance, but exhibit no significant differences in spending on fertilizer, land preparation, planting or harvesting services, or agricultural and non-agricultural investments. OTC financial services likewise show limited association with input use. Relative to households without any financial services, OTC users are only more likely to adopt certified seed.

We also find DFS users are more likely to access formal credit and receive remittances. These financial channels matter: formal credit is associated with higher expenditures on fertilizer, pesticides, planting services, hired labour, total input expenses, and household insurance, while informal credit is associated with greater expenditures on planting services and pesticides. Remittances increase the likelihood of adopting improved variety and certified seeds and raise expenditures on seed, ploughing, and planting. Nonfarm employment, however, is associated with lower agricultural input use, including fertilizer, pesticides, and total input expenditure.

Overall, DFS influences a narrow set of input decisions—mainly seed choice and seed-related spending—while leaving fertilizer and major service expenditures unchanged. DFS function primarily as facilitators via credit and remittances rather than as broad transformers of farm input finance, indicating a limited transformative role at present.

Women in Economics Network (WEN) lunch with Dr. Danielle Wood

12:10 - 13:20 Wednesday, 11th February, 2026

P Riverbank R5

Session description and format

Parallel Session: Agricultural Policy

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R2

Chair: Mark Morrison

Mixed Messages and Opportunity Costs: Self-Sufficiency or Carbon Neutrality

Zaura Fadhliani, David Adamson, Matthew Knowling

The University of Adelide, Adelaide, Australia

Keywords:

3. Agricultural Production

25. Policy Analysis

Paper Abstract:

The main objective of public policy is to establish a clear and logical framework for decision-making, but it is often formed by political interest, institutional dynamic, and competing agendas. The current global situation such as tariff wars, food security concerns, and climate change further complicate policymaking, especially in agriculture. This creates tensions between goals like achieving food self-sufficiency and reducing greenhouse gas emissions, forcing an analysis to weigh trade-offs and long-term welfare impacts. This study aims to explore the potential conflict between Indonesian sugar self-sufficiency goal and its emission reductions commitment. An optimization land reallocation model is utilized to explore the opportunity cost associated with carbon emissions in sugarcane cultivation. The model has objective function to maximize the profits of producers that grow sugarcane and other crops typically cultivated in land appropriate for sugarcane. Following the producers' profit maximization, the carbon emissions from the cultivation of each crop are estimated to enable comparing the emissions of across different production choice, particularly in context of the subsidies applied for sugarcane farming. The findings highlight a critical policy tension between sugar self-sufficiency objectives and carbon reduction goals. Growing sugarcane to meet household or industry needs, especially when supported by input subsidies, leads to increased carbon emissions without providing a clear economic benefit. When the farms are free to select the most profitable crops, it provides optimal choice for both profit and emissions. This outcome indicates the necessity for careful policy design in promoting self-sufficiency programs, ensuring that environmental goals are not compromised.

Policy Reflections on Sustainable Livelihoods and Local Community Development through Tidal River Basin and Sediment Management (TRBSM) in Southwest Coastal Bangladesh

Md Abdur Rouf

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

Keywords:

3. Agricultural Production

21. Land and Natural Resource Management

Paper Abstract:

The Tidal River Basin and Sediment Management (TRBSM) system is a distinctive and community-driven innovation developed to address the persistent waterlogging, flooding, and salinity challenges of Bangladesh's southwest coastal region. By restoring natural tidal flows, TRBSM facilitates sediment deposition in floodplains and scouring of riverbeds, thereby elevating land, deepening waterways, and reducing drainage congestion. In contrast to structural and engineering-centric interventions such as Sediment Dredging and Regulative Drainage Management (SDRDM), which rely on costly dredging and regulatory structures with limited ecological benefits, TRBSM offers a low-cost, environmentally sustainable, and livelihood-oriented alternative. Beyond its physical benefits, TRBSM enhances agricultural productivity, improves transportation and communication networks, and strengthens local communities' adaptive capacity to climate change and sea-level rise.

However, the adoption and implementation of TRBSM have faced multiple barriers that have shifted over time. In its early phases, obstacles such as institutional inertia, bureaucratic complexities, mistrust among stakeholders, and disputes over crop compensation significantly delayed progress. Although these challenges have gradually diminished due to improved governance arrangements and changes in agricultural practices, new and more entrenched barriers have emerged. Among these, resistance from powerful fish farmers has proven to be the most formidable. Large-scale aquaculture operators, many of whom lease land but do not own it, experience financial losses under TRBSM. Their economic strength, political patronage, and organizational networks allow them to mobilize resistance and manipulate poorer groups, including landless laborers and marginal farmers, thereby stalling TRBSM initiatives. This opposition is compounded by the environmental degradation and social inequalities generated by perennial fish farming, which further underscores the necessity of scaling up TRBSM.

Short-term livelihood disruptions during TRBSM operations also create resistance among wage-dependent households. While these effects are temporary, they highlight the need for transitional support measures, including vocational training, alternative employment opportunities in nearby industries, and access to affordable credit facilities. Without such interventions, vulnerable groups remain susceptible to manipulation by vested interests.

This study draws on focus group discussions, expert consultations, and secondary literature to investigate the evolving barriers to TRBSM and to generate policy reflections for its sustainable integration into coastal development planning. The findings suggest three critical areas of reform: (i) the establishment of transparent and inclusive compensation mechanisms, extending beyond landowners to cover landless and marginalized stakeholders; (ii) the integration of fish farmers into TRBSM processes through zoning, co-management, and incentive-based approaches; and (iii) the introduction of targeted livelihood interventions to reduce transitional hardships.

Finally, the study highlights the limitations of the Bangladesh Water Development Board (BWDB) as the primary implementing institution. It recommends the creation of an **Independent Commission for Sustainable Coastal Development (CSCD)** to ensure participatory planning, cross-sectoral coordination, and transparent monitoring. By institutionalizing TRBSM within a broader framework of integrated coastal zone management, Bangladesh can advance sustainable livelihoods, promote climate resilience, and provide a replicable model for deltaic regions worldwide.

Left Hanging – The Unintended Consequences of California's Agricultural Burn Ban

Lynn Hamilton, Michael McCullough

Cal Poly, San Luis Obispo, USA

Keywords:

25. Policy Analysis

32. Wine and Horticultural Systems

Paper Abstract:

California's San Joaquin Valley (SJV) is home to some of the largest vineyards and wineries in the U.S. and world. The region also has some of the worst air quality in the U.S. California Senate Bill 705 brought the state's agricultural industry under the auspices of the Clean Air Act in 2004. To meet increasingly stringent ozone and fine particulate matter (PM2.5) standards, the San Joaquin Valley Air Pollution Control District (District) adopted the nation's most restrictive air quality regulations. Since agriculture accounts for a significant portion of air emissions in the Valley, many of these regulations have focused on agricultural practices.

A drought beginning in 2011 caused massive removal of distressed vineyards. At the same time, nearly 75% of the Valley's biomass facilities closed as government subsidies expired, significantly limiting the biomass disposal options available to growers. For economic reasons, many growers chose to dispose of their agricultural biomass through open burning.

A 2020 review by the California Air Resources Board prompted regulators to phase out agricultural burning entirely by Jan. 1, 2025. Large growers (over 1,000 acres) were first in line for compliance, with burning prohibitions taking place January 1, 2023, for vineyards with cordon or spur-pruned vines, and over 250 acres for vineyards with cane-pruned vines. Approximately 70 percent of agricultural biomass open burned in the Valley in 2020 was vineyard material.

This policy change coincided with a global downturn in the wine industry. A global surplus paired with decreasing demand caused prices to plummet and many acres left unharvested. Industry experts note that 50,000 acres need to be removed (about 10% of total acreage) to align supply with demand; in 2024, only 17,500 acres were removed. The additional expense of removing vines in the SJV slows the industry's adjustment and creates externalities such as increased pest pressure caused by abandoned vineyards.

To ease the financial burden of compliance, the state funded $180 million in grants to offset the additional costs for chipping and soil incorporation. Incentives range from $800/acre for cane-pruned without soil incorporation up to $1,300/acre for cordon-pruned vineyards in which the biomass is either incorporated into the soil or is recycled beneficially offsite. There is a cap of 500 acres of removal per applicant per calendar year. Small operators (100 acres or less) qualify for an additional $400 per acre incentive as the cost of bringing expensive chipping equipment to a small operation can reduce providers' willingness to service smaller growers.

While the incentive funds have not yet been exhausted, the industry is concerned that the ongoing cost of vineyard removal will soon become solely the growers' responsibility after the phase-in period ends next year. We estimate those costs based on low, medium, and high vineyard removal scenarios. In addition, as climate concerns become more widespread and creep into other state's policy agendas, the issue of how to cost-effectively remove agricultural woody biomass with minimal carbon release may become more of a national concern.

Improving Assurance Schemes Through the Identification of Core Design Features and Options and the use of Design Thinking Workshops Involving AgriFood Value Chain Stakeholders

Mark Morrison

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Keywords:

1. Agribusiness

23. Market Design and Policy

Paper Abstract:

Third party assurance or certification schemes are commonly used internationally for guaranteeing use of specific production standards including standards related to environmental sustainability, animal welfare, and labour practices. Third party schemes are commonly contrasted in the literature with participatory guarantee schemes which are "second-party" and involve peer auditing, as well as schemes that involve some component of "first-party" or self auditing. Other schemes types are also used international though not in Australia, such as Internal Control Systems, which involve treating a group of smaller farms as a single unit and auditing the group as a whole.

The presence of such assurance schemes are critical for shaping markets so that they are better able to provide incentives to farmers for improving land management, such as the use of soil stewardship practices. This is because of the information provision role of certification and assurance schemes – they provide certainty to the value chain –including end consumers – that the promised practices are in fact delivered. However, our earlier research findings indicate that consumers, manufactures, retailers and banks do not consider that existing certification and assurance schemes are sufficient for this purpose, which raises the question of how existing schemes might be improved.

We demonstrate that rather than treating first, second and third party schemes as being discrete and qualitatively different, that these assurance schemes can be considered to comprise of a set of design features with each feature having different design options. This perspective provides much greater flexibility when designing an optimal assurance scheme for a specific context, or when seeking to improve the design of existing assurance schemes.

We completed a systematic literature review and audit of current Australian and a sample of international assurance schemes relevant for soil stewardship and identified a finite set of design features and design options for these features.

A series of design thinking workshop with agri-food value chain stakeholders – including farm industry representatives, manufacturers, wholesalers, banks, retailers, soil scientists and others – were then conducted. In the workshops the participants were presented with the different design features and options that we identified through the literature review, and were asked to identified preferred options for each feature. This included design options that are not currently used in Australia. Two separate groups worked within the workshops and each group identified a potentially optimal assurance scheme. While the two schemes shared much in common, there were meaningful differences. Farmer feedback on the two schemes will be sought next through the use of focus groups. The goal of this research is not to create additional assurance schemes, but to provide insight into how existing Australian schemes might be improved.

Parallel Session: Fisheries & Marine Environments: Sponsored by BDO Australia

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R3

Chair: Anders Magnusson

Explaining ecological success: the role of nature and institutions in managing local conservation areas

Benjamin Chipperfield[1], Paulo Santos[1], Carly Cook[2]

[1]Monash University, Caulfield, Australia. [2]Monash University, Clayton, Australia

Keywords:

5. Biodiversity

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

Why some locally managed conservation areas succeed while others do not remains poorly understood, despite increasing calls to expand conservation areas and address the biodiversity crisis. This paper explores the relative importance of resource characteristics as well as the institutions created to manage them in explaining the ecological success of Fish Conservation Zones, as measured by two indicators of biodiversity (species and functional richness). Using decision tree ensembles and regularization-based machine learning methods, we show that community participation in defining and approving regulations for conservation areas is an important predictor of ecological success.

Financial Ties and Credit Dynamics: Can the Transformation of Financial Institutions Eradicate Hunger and Poverty Among Indonesian Fishermen?

Moh Shadiqur Rahman, Tina Sri Purwanti, Mohammad Wahyu Firdaus

Universitas Brawijaya, Malang, Indonesia

Keywords:

2. Agricultural Finance

16. Fisheries, Marine Systems and Aquaculture

19. Impact Assessment

Paper Abstract:

Limited financial access remains a structural driver of poverty and food insecurity in coastal communities. Although prior research has established that credit access can enhance economic outcomes, there is limited empirical evidence on how the effects vary across credit access types namely, formal, informal, and no access, especially in coastal settings. This study addresses this gap by analyzing the differential impacts of credit access type on food security and subjective well-being among fishing households in Indonesia. Drawing on primary survey data from 450 fishermen and applying a multivalued treatment effect (MVTE) framework, we estimate the causal impacts of credit type on both objective welfare indicators—household income, Food Consumption Score (FCS), and Food Insecurity Experience Scale (FIES)—and subjective dimensions of well-being, including happiness and life satisfaction. The results show that reliance on informal credit exacerbates financial vulnerability, significantly reducing dietary diversity, heightening food insecurity, and lowering household income, without improving subjective well-being. In contrast, access to formal credit consistently improves household welfare by enhancing food consumption, reducing food insecurity, raising income, and strengthening reported happiness and life satisfaction. These findings imply that expanding formal financial institutions is essential to alleviate food insecurity and poverty in coastal communities while fostering sustainable improvements in both material and psychological well-being among small-scale fishermen.

Relative importance of multiple objectives of Sri Lankan fisheries policy

Nipuni Abeysiriwardena[1], Louisa Coglan[1], Sean Pascoe[2]

[1]Queensland University of Technology, Brisbane, Australia. [2]CSIRO, Brisbane, Australia

Keywords:

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

Abstract

Fisheries management involves balancing multiple economic, social, and environmental objectives across a diverse range of stakeholders. Multi-criteria decision-making models can support policymakers in identifying the trade-offs and assist in balancing multiple objectives to design effective and sustainable fisheries management plans. Despite several studies on the relative importance of the policy objectives of the fisheries, there is limited literature conducted in the context of developing countries. This study will be novel as it is one of the first studies analysing the stakeholders' perspectives on the relative importance of policy objectives of marine fisheries in Sri Lanka.

This study uses the Analytic Hierarchy Process (AHP) to assess the relative importance of fisheries management objectives and guide decision-making. Data are collected through an online survey from 115 fisheries stakeholders in Sri Lanka, including fishers, policy makers, conservation groups, community representatives, economic advisors, scientists and other related supporting services. We derive the mean and distribution of the weighted priorities assigned to each objective by different stakeholder groups. This allows us to identify the

potential points of conflict for the diverse groups with different priorities across multiple objectives.

Futures of Seafood: Mapping and Valuing Australia's Post-Harvest Supply Chain

Anders Magnusson, Abbie Dix

BDO Australia, Adelaide, Australia

Keywords:

16. Fisheries, Marine Systems and Aquaculture

19. Impact Assessment

Paper Abstract:

Australia's seafood sector is undergoing transformation as it responds to climate impacts, shifting market conditions, evolving consumer demands, and the effects of policy and management decisions aimed at environmental stewardship and sustainable ocean use, with implications for the whole supply-chain. This study, part of the Futures of Seafood project, aimed to map and value the post-harvest supply chain for key fisheries and aquaculture sectors across all Australian jurisdictions.

We developed a seafood-focused, multi-region economic model using satellite accounting to extend the ABS National Input-Output framework. This enabled detailed tracking of seafood products from landing through processing, distribution, consumption, and export. By integrating sector-specific and broader economic data, we constructed a multi-region input-output (MRIO) model of Australian states and territories that captures interregional flows and value addition at each supply chain stage.

Supply chain simulations were conducted for each commercial fishery and aquaculture sector, using Gross Value of Production (GVP) and disaggregated jurisdictional data where available. The model estimated product flows, margins, and economic indicators. This included GVP, final sales value, gross domestic/state product, and employment at both the state/territory and supply chain stage levels. Where sector-specific data was limited, imputation was based on average state/territory flows.

Our findings provide new insights into Australia's seafood consumption patterns and the interregional economic contributions of the supply chain. Results are presented in accessible sector-level factsheets to support evidence-based policy and industry decision-making. This work demonstrates the value of integrated economic modelling for informing sustainable transitions in agri-food systems.

Parallel Session: Climate Change & Policy

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R4

Chair: David Stern

Swimming with the Current, Rather than Against It: Harnessing Human Nature through Behavioural Economics in Transitioning to a Sustainable Future

Richard Reeve

N/A, Brisbane, Australia

Keywords:

14. Environmental Economics

25. Policy Analysis

Paper Abstract:

From the 1972 Stockholm Conference – which paved the way for the establishment of the United Nations Environment Programme – to the 2025 Intergovernmental Negotiating Committee on Plastic Pollution, sustainability has steadily moved from the margins to the mainstream of global policy.

In parallel, economics has long recognised market failures, particularly environmental externalities, establishing a durable consensus that market-based instruments (MBIs) are efficient and equitable tools. Pigouvian taxes and tradable permits embody the *polluter pays principle*, ensuring that private actors bear the true social costs of their activities. Yet application remains patchy and politically fraught.

Part of the challenge lies in the asymmetry of costs. The harms of inaction—environmental degradation, biodiversity loss, taxpayer-funded remediation—are diffuse, delayed, and often invisible, whereas the costs of MBIs are immediate, visible, and certain. Hyperbolic discounting ensures that people consistently avoid short-term costs even when long-term benefits are far greater. Australia's compulsory superannuation system is itself an institutional response to this bias.

On one side lies expert technical advice; on the other, an entrenched status quo that allows firms to privatise profits while socialising environmental costs. Between these poles lie voters, politicians, media ecosystems, and the lobbying of vested interests. Neoclassical economics, with its assumption of rational utility-maximising agents, has long reinforced the "information deficit model": the belief that if consumers and decision-makers are given more information, they will make better, more informed choices.

Behavioural economics has fundamentally challenged this premise. Kahneman's work on dual-process thinking, together with the research of Tversky, Ariely, Thaler, and Sunstein, shows that

human decision-making is systematically biased rather than rational. People rely on fast, intuitive reasoning rather than slow, deliberative analysis, making them susceptible to predictable biases such as status quo bias, loss aversion, anchoring, confirmation bias, and hyperbolic discounting. These biases consistently skew against reform and in favour of the existing order, while inconsistency and "noise" in judgment further amplify inertia.

The puzzle is therefore meta: if these cognitive barriers are so well mapped, why has policy design not more consistently incorporated them into environmental reform? Institutions such as the Productivity Commission, the OECD, and the World Bank increasingly acknowledge behavioural barriers in their frameworks, yet practice still lags behind. Most policy effort continues to default to information provision rather than building institutions and instruments that work with human psychology rather than against it.

This paper explores the persistent gap between what science knows and what society does. It argues that bridging the science–policy divide requires reframing MBIs through fairness and reciprocity, countering misinformation, reducing cognitive load, and designing policies that align with moral intuitions and political incentives. The challenge is designing institutions that translate behavioural insight into durable environmental reform; working with rather than against human nature.

Costs of delaying climate policies in the primary sector in New Zealand

Yuelu Xu

New Zealand Institute for Bioeconomy Science Limited, Auckland, New Zealand

Keywords:

8. Climate Change

24. Mathematical Programming

Paper Abstract:

The agricultural and forestry sectors play a central role in New Zealand's (NZ) economy, accounting for around 81 percent of merchandise export earnings (MPI 2024). Yet agriculture remains the largest source of greenhouse gas (GHG) emissions, contributing 53 percent of NZ's total GHG profile in 2023, primarily from methane and nitrous oxide emitted by livestock (MfE 2025). Since the early 2000s, efforts to reduce agricultural emissions have evolved in response to the sector's economic significance and the political sensitivity of regulating biological emissions. Initial attempts to introduce a levy in 2003 were abandoned following farmer opposition, leading to a reliance on industry-funded research and partnership initiatives such as the Global Research Alliance and He Waka Eke Noa. The Zero Carbon Act (2019) set binding methane reduction targets, though implementation of farm-level pricing has faced repeated delays (Leining et al., 2020; Ministry for the Environment, 2023).

Over the past two decades, NZ's land use has shifted markedly from extensive sheep and beef systems toward intensive dairy production, with dairy herd numbers and irrigated land expanding while sheep and beef herds contracted. These structural changes have raised

agricultural emissions despite growing carbon sequestration from forestry. The interaction of delayed policy action, technological progress, and land-use intensification has made the cost of inaction increasingly uncertain. Postponing climate policies risks locking in higher-emitting production systems, reducing future flexibility, and increasing the overall cost of achieving national targets.

This study applies the New Zealand Forest and Agriculture Regional Model (NZFARM), an integrated partial-equilibrium framework, to quantify the monetary costs of delaying domestic climate policy in the agricultural sector and to evaluate the efficiency of alternative mitigation pathways.

Reference

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Prioritising Agronomy in Changing Environments: a systematic assessment of challenge and adaptation prioritisation in South Asia.

Mackenzie Coopman, Brendan Brown

CSIRO, Adelaide, Australia

Keywords:

8. Climate Change

26. Practice Change and Adoption

Paper Abstract:

The viability of agricultural production systems in supporting economic and food security across South Asia is threatened by rapidly growing populations as well as agronomic, climatic, and socioeconomic challenges. The Eastern Gangetic Plains (EGP) of India, Bangladesh and Nepal are particularly susceptible to these challenges due to its large and dense population combined with a high concentration of rural poverty. To effectively and sustainably bolster agricultural productivity, targeted, context-specific intervention is crucial. In this study, the Prioritising Agronomy in Changing Environments (PAiCE) toolkit is applied to the EGP with the goal of

prioritising the region's most damaging agronomic and climatic constraints, potential investment priorities, and key data uncertainties.

PAiCE assesses challenges and adaptation options in a structured framework that characterises production constraints and climate challenges in a specific production domain using data and expert elicitation. Next, adaptation options for addressing these challenges are assessed in a workshop setting. To improve the validity of PAiCE, the Adoption and Diffusion Outcome Prediction Tool (ADOPT) are integrated within PAiCE to predict the peak adoption rate of adaptations and introduce a temporal element to the adoption of adaptations, assessing cumulative benefits over a designated event horizon.

The PAiCE workshops brought together 85 experts representing 37 unique organisations across three workshops held in India and Nepal. A total of 43 challenges were assessed and location-specific priorities with an emphasis on water-related constraints and suboptimal practices were identified. A total of 52 potential adaptation options were assessed and prioritised options again demonstrate location specificity. Each assessment highlighted multiple high-potential adaptations including zero and minimum tillage, optimised input management and improved planting practices. The simultaneous prioritisation of diverse, non-overlapping adaptation options within individual assessments, in addition to the identification of contextual trade-offs for high-potential adaptations, emphasises the need for investment to support concurrent high-priority adaptations instead of a single priority.

The integration of ADOPT had a substantial impact on the prioritised adaptation strategies, illustrating why investment programming should place significant emphasis on understanding the potential adoption of supported practice changes within its target population. The general overestimation in peak adoption rates by in workshops compared with the estimates provided by ADOPT suggests that there is potential for strategies to be misjudged regarding adoption rates, further emphasising the importance of analytical, data-driven prioritisation. Data uncertainty highlighted climate challenges and their interactions with adaptations as a priority for further research but also suggested that there is potential for improvement across all input types. Iterative workshops provide an opportunity to improve data quality.

How Effective is Carbon Pricing in Reducing Carbon Emissions Intensity? A meta-analysis of the quasi-experimental research

David Stern[1], MiLim Kim[2]

[1]Australian National University, Canberra, Australia. [2]alian National University, Canberra, Australia

Keywords:

8. Climate Change

25. Policy Analysis

Paper Abstract:

We conduct a systematic review and meta-analysis of the econometric research that estimates the causal impact of carbon pricing on carbon emissions intensity per unit of output by using quasi-experiment approaches such as difference-in-differences (DiD). We search bibliographic databases using replicable search strings and screen records with transparent inclusion and exclusion criteria, resulting in 276 useable effect sizes from 42 papers. The unweighted mean of the standardized effect size is a -12.3% reduction in carbon intensity. The funnel plots are asymmetric indicating selective reporting. A series of meta-regression analyses also indicate the presence of publication bias. Our meta-regression analysis suggests that the mean genuine effect of carbon pricing with correction of publication bias is -7.1% (standard error 1.5%). The effect of carbon pricing is similar for the European Union and Chinese pilot ETS's at -7.8% (0.7%) and -7.0% (1.7%), respectively. The mean effect in the Korean ETS and the British Columbian carbon tax is lower at -3.4% (1.9%).

Parallel Session: Ecological & Resource Management

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R5

Chair: Peter Tozer

A bioeconomic framework for prioritising threatened species management: The Norfolk Island Conservation Compass tool

Chuanji Yong

University of Western Australi, Perth, Australia

Keywords:

11. Ecological Economics

14. Environmental Economics

Paper Abstract:

Conservation management strategies have management target outcomes and respective action plans (a set of management activities for the threat or threatened species to achieve target outcomes). With the competing needs of threatened species management on Norfolk Island, decisions on park-level management programs need to be made with a clear understanding of the impacts of decisions relating to these programs on the budget required for delivery.

There is limited knowledge of how management costs, threats and target outcomes (values/threatened species) vary when management actions are altered. A bioeconomic model employs both economic and biophysical elements to inform decision-makers about the trade-offs in management, including trade-offs between economic resources and biophysical targets.

Here we present a bioeconomic simulation model for the Mt Pitt area of Norfolk Island National Park. We outline a conceptual map of the system, modelling key interactions, target outcomes, management actions and the associated costs. This aims to quantify how management costs, threats and target outcomes (values/threatened species) will vary when management actions are altered.

This research will assist the Norfolk Island National Park and the Norfolk Island Regional Council staff to make informed decisions on park-level management programs, with a clear understanding of the likely impacts of decisions relating to these programs on the budget required for delivery, the target outcomes, and the threats to be managed.

Why Do Linear Methods Miss Spatial Patterns? Uncovering Hidden Geographic Complexity in Water Pricing in Australia

Jaba Rani Sarker, John Rolfe, Delwar Akbar

Central Queensland University, Rockhampton, Australia

Keywords:

21. Land and Natural Resource Management

31. Water

Paper Abstract:

Standard linear regression methods sometimes miss complex spatial patterns in economic data, leading to inaccurate judgments about the geographic implications of resource prices. This study addresses this methodological issue by analysing regional and temporal trends in water pricing using panel data from 16 Queensland water supply schemes over 11 years (2015-2025), employing three complementary analytical methods. First, we employed cross-sectional linear regression analysis to examine discrete spatial and sectoral effects. The analysis identified substantial regional variation (R^2 = 0.553), with prices in cotton-producing areas being 258% higher, prices in horticulture areas being 81.1% higher, and prices in the Burdekin (sugarcane) region being 63% lower. Secondly, fixed effects panel data methods were used to examine the temporal dynamics. The results showed a substantial structural change starting in 2019, with prices rising steadily by 129–238% above 2015 baseline levels through to 2025. This suggests that the market is changing in a fundamental way rather than just going through cycles. Thirdly, gradient analysis employing Generalized Additive Models (GAMs) were used to investigate sophisticated spatial linkages. This revealed highly significant non-linear spatial patterns that explained 48.8% of the price variation through multi-modal geographic structures. The spatial relationship demonstrates extreme complexity, requiring approximately eight directional changes to model the geographic pricing patterns adequately. This high complexity manifests as a multi-modal pattern with four primary geographic zones: a northern low-price zone around latitude 19.5° where prices are approximately 1,500 units below average, a central high-price cluster near latitude 22-23° with prices 600-700 units above average, a southern moderate zone around latitude 25-26°, and an extreme southern high-price zone at latitude 28°+ where prices spike to 1,500 units above the regional mean. The temporal component reveals that water pricing evolution over the 2015-2025 period follows a complex, non-linear trajectory, suggesting approximately four directional changes in pricing trends. The high edf-to-ref.df ratios for both spatial (95.2%) and temporal (81.0%) components demonstrate that the underlying relationships require sophisticated non-linear modeling approaches, explaining why conventional linear methods failed to detect these patterns and making GAM three times more effective than linear specifications. This spatial structure represents extreme geographic inequality, with total price differentials of approximately 3,000 units across the study region—representing a 160% price variation that creates implications for water policy, market regulation, and cost recovery.

Spatial Attainment of Plural Nature Values: A CFA–SFA Spatial Econometric Framework

Hirotaka MATSUDA, Mika YAMAMOTO

Tokyo Univesity of Agriculture, Kanagawa, Japan

Keywords:

11. Ecological Economics

21. Land and Natural Resource Management

Paper Abstract:

Introduction

Conventional approaches that compress nature's value into one or a few indicators—monetary metrics from cost–benefit analysis or simple biophysical counts—do not capture heterogeneous value concepts, cultural contexts, or relationship-based meanings. The IPBES Nature Futures Framework (NFF) advances the field by theorizing a tri-axial value space (Nature for Nature, Nature for Society, Nature as Culture). Yet a statistically coherent protocol to operationalize these axes at individual and regional scales—while handling measurement error, response styles, and comparability—remains underdeveloped. This study proposes and tests an integrated framework that, first, identifies the three latent value dimensions via confirmatory factor analysis (CFA) using multiple items per axis, and second, translates the factor scores into a single, theory-constrained "distance to the ideal point" using stochastic frontier analysis (SFA). We test in Japan, where diverse social–ecological systems co-exist at fine spatial scales.

Method and Data

We fielded a national online questionnaire covering all three NFF axes, yielding about 5,000 responses. For each axis we designed multiple ordinal items and applied CFA to estimate three latent scores. Partial measurement invariance enabled cross-regional comparisons, and acquiescence was modeled to control response-style bias. Factor scores were rescaled to a common metric. We defined "distance to the ideal point" as the improvement required to move all three axes jointly toward the ideal and estimated this distance within an SFA framework. The dependent variable was this distance (smaller values indicate higher attainment). Independent variables captured surrounding natural environments: 1-km grid cropland and forest area, and distances to coral reefs, tidal flats, and sandy beaches from public geospatial data (MLIT, 2014; MOE, 2005). Municipality-level City Biodiversity Index indicators—scores 4, 6, and 7 (MLIT, 2016)—reflected local biodiversity efforts and urban ecosystem quality. Environmental covariates were spatially joined to respondents' locations; spatial dependence was accommodated by allowing the inefficiency component to exhibit autocorrelation across adjacent grids or municipalities. Estimation followed a Bayesian specification with uncertainty reported; sensitivity checks covered rescaling, direction settings, and alternative distance formulations.

Research and Discussion

The framework yielded jointly estimated latent scores and a spatially explicit distance measure, providing an interpretable attainment indicator. Distances were systematically explained by

surrounding environments. Greater cropland and forest area within 1-km grids was associated with smaller distances, primarily through the intrinsic value dimension; proximity to coastal ecosystems was linked to smaller distances via instrumental and relational dimensions. City Biodiversity Index indicators were negatively associated with distance. Incorporating spatial autocorrelation improved fit and revealed coherent clusters of low and moderate distances across neighboring areas. Complementarity and trade-off patterns aligned with expectations: strengthening relational values tended to co-move with instrumental values, whereas additional gains in intrinsic values required nearby natural areas. Sensitivity analyses confirmed robustness to alternative direction choices, distance specifications, and relaxed invariance constraints.

Economic Impact of Sand and Dust Storms in Kuwait

Peter Tozer[1], Ali Al-Hemoud[2], Nicholas Middleton[3]

[1]PRT Consulting, Cunderdin, Australia. [2]Kuwait Institute for Scientific Research, Kuwait, Kuwait. [3]Oxford University, Oxford, United Kingdom

Keywords:

11. Ecological Economics

21. Land and Natural Resource Management

Paper Abstract:

There is a limited number of studies examining the economic impact of sand and dust storms (SDS), which are frequent hazards in Western Asia and the Middle East. This research aims to review the sectors affected by SDS in Kuwait, estimate the resulting economic costs and offer guidance on identifying and collecting missing data. Between 2006 and 2022, the average annual economic impact of SDS in Kuwait was estimated at US$195 million (in 2022 dollars). Annual losses ranged from US$14 million to US$698 million, depending on the number of SDS events each year, which varied from 1 to 22 in the period under study. The most significant impact was observed in the oil production and export sector, given its prominent role in Kuwait's economy. The airline industry and public works also incurred substantial costs due to SDS. In contrast, agriculture did not appear to be significantly affected, possibly because of greenhouse production and seasonal timing of certain crops that avoids peak SDS periods. However, no comprehensive assessment has been conducted on the effects of SDS on crop cultivation or pastoralism in Kuwait. Other sectors, including education, construction, healthcare, and defense reported qualitative impacts from SDS events, but it was not possible to estimate these costs due to the absence of quantitative data. The research recommends further comprehensive analysis of SDS effects on Kuwait's economy, utilizing surveys and/or interviews as well as enhanced sectoral data identification and collection to map risks and expected impacts.

Parallel Session: Biodiversity

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R6

Chair: Claire Doll

Exploring the value of ecosystem indicators in environmental markets – a conceptual framework from soil carbon and biodiversity case studies

Anthea Coggan[1], Sarah Luxton[2], Greg Smith[3], Daniel Grainger[4], Katrina Szetey[2], Suzanne Prober[2], Kristen Williams[2], Lynne Macdonald[5], Simon Ferrier[2], Nikki Dumbrell[2]

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Keywords:

5. Biodiversity

7. Carbon and Nature Markets

Paper Abstract:

Environmental markets are increasingly promoted as vital tools for achieving nature-positive outcomes. However, their effectiveness is often hindered by the complexity of information required for participation and monitoring, which imposes significant transaction costs on land managers and investors. This paper explores the role of indicators in reducing these barriers and enhancing market functionality. Using case studies from Australia's established carbon market and the emerging Nature Repair Market, we identify key decision points and articulate how indicators support the five key stages for a project under such markets: 1) problem identification, 2) planning and design, 3) project commencement, 4) monitoring and adaptive management, and 5) project completion and evaluation. We classify indicators as lagging, coincident and leading, and contrast the roles of these indicators at different stages of the market's lifecycle. We propose a conceptual framework for considering the various indicators—based on the concepts of flexibility, legitimacy, credibility and saliency. Our findings suggest that well-designed, context-appropriate indicators can streamline information flows, reduce transaction costs arising from bounded rationality to better incentivise behaviours for improved environmental outcomes. We conclude by outlining a research agenda for developing incentive-compatible, context and human appropriate indicators that support environmental gain for biodiversity and carbon goals and beyond.

Pathways to resolve the trade-offs in food demand, biodiversity loss and land-use in India

Ankit Saha[1,2], Vartika Singh[3], Miodrag Stevanovic[4], Ranjan Kumar Ghosh[1], Hermann Lotze-Campen[2,4], Aline Mosnier[5], Sarah Jones[6]

[1]Indian Institute of Management Ahmedabad (IIMA), Ahmedabad, India. [2]Humboldt University of Berlin, Berlin, Germany. [3]International Food Policy Research Institute (IFPRI), New Delhi, India. [4]Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany. [5]UN-SDSN, Paris, France. [6]Alliance Biodiversity - CIAT, Montpellier, France

Keywords:

5. Biodiversity

8. Climate Change

Paper Abstract:

Agriculture and biodiversity are intricately linked, with the former often negatively impacting the latter. Agricultural production has been found to affect biodiversity loss, majorly due to intensification as well as downstream effects like water and soil contamination from agrochemicals. Biodiversity upholds ecosystem stability and human well-being by sustaining food production, regulating ecological processes, and supporting climate resilience. Conservation strategies often hinge on land-sharing, which promotes biodiversity-friendly farming, and land-sparing, which preserves natural habitats by intensifying production elsewhere. This study examines the interactions between agriculture, land use, and biodiversity in the context of India's food security needs and commitments to the Sustainable Development Goals (SDGs).

Recognizing the vital role of biodiversity in agriculture and the detrimental impact of certain agricultural practices on ecological diversity, the study explores potential futures using the Food, Agriculture, Biodiversity, Land, and Energy (FABLE) calculator for India, a multi-sectoral scenario modeling tool. We develop three pathways to 2050 - (1) Current Trends (CT), which reflects business-as-usual patterns; (2) a National Commitments Pathway (NCP) which consider scenarios aligned with India's climate and agricultural policies; (3) a Biodiverse Pathway (BP) that incorporates ambitious agroecological practices and afforestation efforts. We analyse the consequences of varying pathways on important indicators such as biodiversity intactness, agricultural production and other potential effects on the environment such as greenhouse gas emissions (GHG) from the Agriculture, Forestry, and Other Land-use (AFOLU) sector.

The key distinction between BP and NCP lies in the adoption strategy: while NCP assumes a uniform shift of cropland to organic farming, BP incorporates a diversified mix of agroecological practices tailored to different crop groups. This broader approach reduces cropland demand by about 35% compared to CT (versus ~30% under NCP), enabling additional land to be redirected towards afforestation. Consequently, BP delivers stronger biodiversity and climate outcomes, with the Biodiversity Intactness Index rising to 73.5 by 2050 (compared to 71.5 under NCP and a decline to 65.4 under CT). Greenhouse gas emissions also fall more sharply under BP, reaching 623 $MtCO_2e$ in 2050, compared to 704 $MtCO_2e$ under NCP and an increase to 1,044 $MtCO_2e$ under CT. The integration of agroecological practices with targeted afforestation thus emerges as a critical lever for achieving synergies between food security, biodiversity conservation, and climate mitigation.

These findings highlight that expanding extensive agriculture to enhance ecological services, combined with afforestation, represents the most sustainable pathway forward. By going

beyond traditional conservation framings such as land-sharing and land-sparing, our analysis demonstrates that integrated approaches can deliver favourable effects for both biodiversity and environment. The policy implications point to the need for integrated land-use strategies that incentivize agroecological practices and ecosystem restoration, aligning agricultural growth with biodiversity conservation and climate goals.

Financing threatened species recovery through carbon sequestration markets

Reiss McLeod

Monash University, Melbourne, Australia

Keywords:

5. Biodiversity

7. Carbon and Nature Markets

Paper Abstract:

Biodiversity is declining rapidly, with implications for actors dependent on nature. While finance is slowly being mobilised, the biodiversity financing gap remains roughly USD 700 billion. Carbon markets offer one channel to fund biodiversity management. This paper estimates the effect of conserving and restoring the Southern Cassowary, one of Australia's keystone species, on terrestrial carbon stocks. We assemble Australia-wide spatial data, combining current and historical cassowary ranges with environmental covariates on vegetation type, above- and below-ground carbon, soil characteristics, climate, topography, and protected area status, to construct a cross-sectional dataset. Using matching estimators, we estimate the carbon stock attributable to (i) conservation of the current cassowary range and (ii) recovery of the historical range. We find that conservation yields larger carbon gains than restoration, and that the size of the effect is heterogenous across vegetation types. Back-of-the-envelope calculations suggest that for approximately 20% of the total restorable area, the implied carbon revenue from Australian carbon markets could finance cassowary recovery. Policy implications are twofold: first, estimating changes in carbon stock could guide targeting of species recovery by prioritising species and habitats with the highest carbon co-benefits; second, carbon markets could provide a practical financing mechanism for biodiversity recovery.

Environmental offset system design: Towards no net loss of biodiversity

Claire Doll, David Pannell

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Keywords:

5. Biodiversity

7. Carbon and Nature Markets

Paper Abstract:

Environmental offsets are widely used as an environmental policy instrument to compensate for negative environmental impacts associated with development projects. However, reviews of offsetting systems around the world increasingly reveal accounts of failing to achieve no net loss of biodiversity, and public confidence in these systems is declining. This research builds on experiences reviewing the Australian national offsets system, including their offsets calculator (the Offsets Assessment Guide), along with reviews of state offsetting systems in Western Australia and South Australia, to inform a set of best practices in offset system development. Our assessment is supported by a process of expert elicitation with key informants from government, industry, and academia who provide perspectives on what an ideal system would include, and what aspects of existing systems lead to unforeseen challenges. We outline the importance of properly accounting for a set of key principles, including accounting for risk, ensuring additionality, measuring impacts and benefits, and designing a system for long-duration benefits. In addition to addressing core necessary components of a successful offset system, we provide discussion of some uncertain, challenging questions that remain in offsetting systems. For example: 'how should research investments be accounted for in offsetting systems?'; 'what should happen if no suitable offsetting sites are available?'; and 'how should systems balance restoration actions with financial contributions?' Overall, we show that designing an environmental offset system that balances environmental protection with economic development in a way that ensures no-net loss requires getting many elements right. Getting these factors right has difficult implications, like the need for strict monitoring and compliance enforcement. However, if these elements are not properly considered, there may be additional costs to governments down the line, or continued biodiversity declines. This set of best practices can be used by state and national governments in creating new offsetting systems, and in revising existing systems that are currently under-performing.

Parallel Session: Livestock & Dairy

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R6B

Chair: Vyta Hanifah

Economic and social impacts of shifting to sustainable input use and farming systems in lowland wet season rice production in Lao PDR

Chinthani Rathnayake[1], Alexandria Sinnett[1], Chitpasong Kousonsavath[2], Margaret Ayre[1], Garry Griffith[1], John Mullen[3], Fue Yang[2], Lytoua Chialue[2], Bill Malcolm[1]

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Keywords:

15. Farm Management and Farmer Behaviour

25. Policy Analysis

Paper Abstract:

Rice is the staple food crop in Lao PDR (Laos), where most smallholder households engage in rice production, mainly for subsistence and sale of any surplus. Laos has encouraged its agricultural sector to shift towards sustainable input use and farming systems, thereby reducing pollution, waste and lowering GHG emissions. There is pressure on farming systems involved in rice production to change input use. This ACIAR Small Research Activity (SRA) aims to evaluate the social, economic and environmental implications of changes in inputs and farm systems for rice farming households, value-chain participants, and the rice industry in Laos. The study applies farm economics, social science research and market economics to explore impacts of different technologies on rice production. This paper provides an overview of the findings from this study.

We learned that most farmers produce rice using fertiliser, where 70% of lowland wet-season rice is produced using two bags of fertiliser and herbicide. At this rate of fertiliser, rice farm businesses are likely to be profitable, generate sufficient cash to cover rice production expenses, produce enough rice to meet household needs and have surplus rice to sell, providing cash for household use. However, financial hardship and risk consideration dissuade farmers from using fertiliser at a rate of five bags, which is likely to be more profitable and closer to the rate recommended by agronomists. The performance of a representative rice farm business and its household rice security are likely to decline if agrochemicals are not used in rice production. Although organic fertilisers are a substitute or supplement for inorganic fertilisers, we learned that rice farmers have limited access to commercial organic fertilisers and lack information

about the quality of such products; hence, they do not trust these products to provide necessary nutrients for their rice crops. Good Agricultural Practice (GAP) in rice production, although widely promoted, was not applied by the rice farmers we spoke to. They stopped this practice because of burdensome record-keeping requirements and the absence of a price premium for GAP rice. Agroecology is often suggested as another approach for transitioning rice farming to less/no agrochemical use; however, there is limited information about the costs, benefits, and risks of changing to and operating this type of system.

Factors influencing rice prices in consumer markets were also analysed. The price of rice offered to consumers varied widely according to a range of characteristics. Organic rice was available in markets, but in very small amounts, with a substantial premium paid by niche consumers. However, these findings were not supported by focus group research with consumers. They understood the standards of organic rice production, but their rice purchasing decisions were little influenced by safety concerns and these standards. Consumers were willing to pay only a small premium for organic rice to compensate farmers' effort and time in adopting required standards.

This research highlights that rice producers in Laos are unlikely to transition to alternative farm practices that don't require agrochemicals without evidence and market premiums to support this practice change.

Smallholder-centred transitions in Brazil's beef sector: risks, opportunities, and the role of cultivated beef

Priyambada Joshi, Ayon Chakraborty, Harpinder Sandhu

Federation University, Ballarat, Australia

Keywords:

22. Livestock Systems

28. Uncertainty and Risk

Paper Abstract:

Brazil's beef sector is central to debates on sustainability and fairness, especially when it comes to including small family farmers. This study applies a ten-dimensional framework to explore pathways for more sustainable and inclusive food systems, including potential links with cultivated beef. We used a mixed-methods approach, combining an online survey of beef producers (n = 68), 35 in-depth interviews with farmers, industry and policy experts, and an analysis of Brazil-specific policy and industry documents. The results highlight four main domains shaping change: (i) environmental risks and sustainable practices, (ii) market and governance challenges, (iii) policy and institutional support, and (iv) farmer perceptions of cultivated beef. The online survey results identified structural risks such as price volatility, high land/feed costs, limited credit, liquidity constraints, and compliance burdens over technological uncertainties. It also identified the strongest support where collaboration and co-existence are emphasised: 34.6% agree farmers could collaborate with the cultivated-beef industry, 32.1%

see opportunities from commercial cultivated beef, and 30.9% believe cultivated and conventional beef can co-exist in the market. Interviews confirm pragmatic openness: many farmers already diversify (e.g., soybean) and would consider cultivated beef if it improves returns and stabilises payments. Producers tend to see cultivated beef not as a farm technology but as a processor-level innovation, with blending or hybrid products as the most realistic entry point. Policy and document analysis highlight enabling levers in regulatory sequencing, such as approval processes by the National Health Surveillance Agency (ANVISA) and the different sanitary inspection systems. They also point to financial and insurance mechanisms under the Low-Carbon Agriculture Program (ABC+), which can support farmers in managing risks and adopting sustainable practices. Findings suggest that viable transition pathways will depend less on new technologies alone and more on governance, finance, and institutional support. The study also points toward practical food system models that include these elements and integrate cultivated beef in ways that support smallholders and strengthen their participation, rather than marginalising them.

Impact of participatory extension intervention on smallholder dairy farmers in Indonesia

Vyta Hanifah[1,2], Rida Akzar[1], Alexandra Peralta[1], Akwasi Ampofo[1]

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Keywords:

19. Impact Assessment

26. Practice Change and Adoption

Paper Abstract:

Promoting technology adoption can improve farming households' livelihoods by increasing production and marketable surplus, leading to higher incomes and improved food security. Yet, adoption rates remain low in developing countries despite substantial investments in extension programs by governments, NGOs, and the private sector. Participatory extension has emerged as an alternative to top-down models, positioning farmers as active partners in learning and innovation. Unlike conventional approaches, participatory approaches foster peer-to-peer learning, create feedback mechanisms, and adapt interventions to local needs. However, most evidence focuses on crop farming, with limited rigorous assessments in livestock, particularly dairy farming. This study addresses these gaps by evaluating the impact of a participatory dairy extension intervention implemented in West Java, Indonesia. The intervention involved discussion groups, technology demonstrations, and focus-farm trials, designed to enhance farmers' awareness, build confidence in applying new practices, encourage peer-to-peer learning, foster adoption and contribute to improved household food security. Farmers were engaged in planning and evaluation meetings, which helped build trust and ownership of the activities. To conduct our evaluation, we applied a mixed-methods approach. The quantitative analysis used panel data from 480 dairy households surveyed in 2017 and 2021 (184 treated and 296 comparison). Outcomes included milk production per cow, awareness and adoption of

dairy technologies, and household food security measured by the Household Food Insecurity Access Scale. Impacts were estimated using two-way fixed effects, with robustness checks conducted through pooled OLS and propensity score matching. Sensitivity analysis was employed to address potential bias due to omitted variables. The qualitative data were collected through focus group discussions with 28 farmers and 7 extension staff. Thematic analysis identified recurrent themes, with illustrative quotes used to contextualise econometric findings. Preliminary results suggest that participation in the extension intervention increased milk production per cow, representing a productivity gain that can lead to additional income. The participants also demonstrated greater awareness and adoption of dairy technologies. Moreover, heterogeneity analysis reveals that households with greater resources were more likely to adopt, indicating that productivity gains were associated with farmers' capacity to access resources. Discussion groups also covered feed and nutrition, especially high-protein concentrates, which may have contributed to higher milk yields among households that could afford them. Household food security showed positive trends of improvement, although not statistically significant. Sensitivity analysis confirmed the robustness of the results, particularly for milk production and awareness outcomes. Our qualitative findings suggest participatory approaches created dynamic learning environments for both farmers and extension staff. Farmers valued the groups as spaces to exchange experiences and compare practices, while cooperative staff reported improved technical knowledge and communication skills. The qualitative results also highlighted the main reasons farmers did not adopt technologies, including high costs, complexity, and lack of information. Participatory extension approaches can enhance farm productivity and increase awareness of dairy technologies by engaging farmers in collective learning and knowledge exchange. Although greater awareness does not necessarily translate into adoption, these results underscore the importance of participatory approaches in raising awareness and fostering social learning, which then leads to practice adoption.

Parallel Session: Agribusiness & Consumer Choice

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R8

Chair: Robin Roberts

Agricultural Credit and the Diversification of Rural Consumption: Formal and Informal Pathways in India

Quan He, Wanglin Ma

Lincoln University, Christchurch, New Zealand

Keywords:

1. Agribusiness

9. Consumer Choice

Paper Abstract:

Abstract

Agricultural credit is vital for farmers to secure production funds and manage agrarian risks, playing an indispensable role in rural development. It is a crucial policy instrument for enhancing farmers' economic returns and improving their multidimensional well-being. While the existing literature largely emphasizes the effects of credit access on agricultural productivity and income, comparatively less attention has been given to its influence on farmers' consumption patterns and the diversification of their expenditures. This study addresses the gap by estimating how access to credit influences household consumption diversity, using data from 793 potato-growing households in India. We employ an endogenous switching regression to address the selection bias arising from both observed and unobserved factors. We categorize household consumption into ten mutually exclusive categories: food, medical, education, entertainment, social activities, rent, clothing, utilities (electricity), agricultural investment, and others. The Gini–Simpson Index is employed to construct a consumption diversity index. Results reveal that access to credit significantly enhances household consumption diversity. Further analysis reveals that, in terms of consumption structure, access to credit significantly increases expenditure on food, education, entertainment, social activities, and utilities, but has no significant impact on medical, clothing, rent, or agricultural investment expenditures. However, the disaggregated analysis shows that access to formal credit does not significantly affect consumption diversity, while access to informal credit significantly reduces it. These findings reveal that while rural credit improves farmers' quality of life, it may also have dual effects, including consumption constraints and debt pressure. At the policy level, efforts should focus on expanding formal financial coverage to reduce farmers' reliance on informal credit, thereby optimizing credit's role in enhancing household consumption and overall well-being.

Keywords: Access to credit; Consumption diversity; Gini–Simpson Index; Endogenous Switching Regression; Potato-farmers; India

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Market Opportunities for New Ready-to-Eat Freshly Packaged Fish Products in Bangladesh

Farhana Arefeen Mila[1,2], Dr. L. Emilio Morales[1], Dr. Sujana Adapa[1], Dr. Nam Hoang[1], Dr. Garry Griffith[1]

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Keywords:

1. Agribusiness

9. Consumer Choice

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

Emerging urban food markets in Bangladesh, particularly in Dhaka city, offer substantial opportunities for introducing Ready-to-Eat (RTE) freshly packaged local fish products to meet the growing demand for safe, convenient, and nutritious protein among time-constrained households that maintain a strong cultural attachment to fish as a staple food. To explore this potential, a structured survey of 400 consumers in Dhaka city was conducted between November 2024 and January 2025 to examine the determinants of willingness to pay (WTP) for newly developed RTE freshly packaged fish in Bangladesh. The results revealed that while only 5% of respondents had prior exposure to imported RTE fish products, 69.75% expressed interest in purchasing locally produced alternatives, indicating strong potential demand for these types of products. Affordability is a critical factor, with Hilsa showing higher acceptance in the moderate premium range (with 39.75% of respondents willing to pay between BDT 51 and BDT 100 extra per 250g). In contrast, premiums for Rohu, Catla, and Silver Pomfret were concentrated in the low range (with 56.25%, 55.5%, and 75%, respectively, willing to pay between BDT 1 and BDT 50 extra per 250 g). Ordinary Least Squares (OLS) regression results revealed distinct yet consistent behavioural patterns across all four species. For Hilsa (Adjusted R^2 = 0.435), the health motive “fish keeps me healthy” ($p < 0.001$) and natural content ($p < 0.01$) significantly increased the WTP premiums, indicating that health-conscious, older, and married consumers showed stronger premium acceptance. For Silver Pomfret (Adjusted R^2 = 0.453), health perception ($p < 0.001$) and natural content ($p <0.001$) were positive predictors of bigger premiums, while sensory appeal ($p < 0.001$) reduced WTP extra. The Rohu model (Adjusted R^2 = 0.490) had the highest explanatory power, where health consciousness ($p < 0.001$), natural content ($p = 0.010$), and shopping convenience ($p < 0.001$) enhanced WTP premiums, while sensory concerns ($p = 0.028$) lowered it. For Catla (Adjusted R^2 = 0.483), health motive ($p < 0.001$), natural content ($p = 0.010$), and variety of fish ($p < 0.001$) positively influenced WTP premiums. Overall, these findings suggest that consumer adoption of new RTE freshly packaged local fish is driven by affordability, perception of natural ingredients, convenience, and health-oriented quality perceptions. These insights underline the potential for RTE freshly packaged

fish innovations in Bangladesh's urban markets, particularly when targeted towards high and middle-income households, and supported by transparent packaging, nutritional claims, and affordable pricing strategies with small packaging sizes. These are valuable insights for industry stakeholders and policymakers involved in the development of competitive, healthy, and value-added processed fish products.

Home, wild and local food procurement in Northern New England associated with improved dietary quality among food insecure household - Heading South Award Winner

Stevens Azima[1], Sam Bliss[2], Rebecca C. Mitchell[2], Janica Anderzén[3], Emily H. Belarmino[2], Sarah A. Nowak[2], Jennifer Laurent[2], Meredith T. Niles[2]

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Keywords:

1. Agribusiness

9. Consumer Choice

Paper Abstract:

Objective: This study examines how participation in Home and Wild Food Procurement (HWFP) and local Direct-to-Consumer (DTC) food channels (e.g., farmer's markets) correlate with dietary quality while considering demographic, food security, and dietary patterns in Northern New England.

Design: Using a cross-sectional survey (Summer 2024), we test two-way interactions between HWFP, DTC participation, food security status, and dietary patterns. Dietary quality is measured by the Prime Diet Quality Score (PDQS, approach 4) and modeled via multiple linear regression adjusted for sociodemographic factors.

Setting: Maine and Vermont, the two most rural states in the United States. Subjects: Racially and ethnically representative sample of 1,438 adults recruited via an online stratified panel.

Results: We find positive associations of improved PDQS among food insecure respondents engaged in both HWFP and DTC channels. Among food-insecure omnivores, HWFP and DTC participation were each significantly associated with increases in PDQS (+2.4 and +2.6 points, respectively; $p < 0.001$). Food-insecure individuals with alternative diets showed significantly higher PDQS scores with more time spent on HWFP (+1.6 points per standard deviation, $p < 0.001$) and with a higher share of food obtained from DTC sources (+1.2 points per standard deviation, $p < 0.01$). A negative interaction between HWFP and DTC participation was observed, indicating that when individuals participated in both, the dietary gains were smaller than when they focused on just one strategy.

Conclusions: Participation in both HWFP and DTC food channels is associated with improved dietary quality, particularly among food-insecure individuals. A negative interaction suggests these strategies may partly substitute for each other in contributing to dietary quality. These

results suggest that expanding access to HWFP and DTC opportunities may therefore provide important nutritional benefits for individuals living in food-insecure households.

Consumers' willingness to pay for traceability features through multiple innovative marketing strategies: A case study of Australian Murray Cod in urban Vietnam

Robin Roberts[1], Di Zeng[2], Alec Zuo[3]

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Keywords:

1. Agribusiness

9. Consumer Choice

Paper Abstract:

As global food supply chains expand and consumer awareness increases, traceability and credence attributes are playing a growing role in food purchasing decisions, particularly in high-growth emerging markets. This study investigates urban Vietnamese consumers' willingness to pay (WTP) for traceability features associated with Australian farm-raised Murray Cod, a premium freshwater fish with strong sustainability credentials. Traceability mechanisms such as QR codes and RFID labels not only convey food safety and quality assurances but also offer marketing value by highlighting environmental stewardship and ethical farming practices. This research explores both the economic valuation of these attributes and the relative effectiveness of different marketing communication strategies in influencing consumer behaviour.

We conducted a large-scale discrete choice experiment (DCE) embedded within a consumer survey administered to 1,250 respondents across major urban centres in Vietnam. Participants were randomly assigned to one of three experimental groups: 1) a control group receiving no prior information, 2) a treatment group exposed to a short informational video highlighting the environmental, sustainability, and traceability aspects of Australian Murray River Cod production in Australia, and 3) a second treatment group, provided with an electronic brochure conveying the same content in textual and visual form. The experiment captures respondents' preferences and trade-offs between price, traceability features, and other product attributes through a series of hypothetical purchasing scenarios.

With elicited consumers' stated preferences, we apply quantitative methods and estimate consumers' WTP for traceability features and examine how exposure to different types of marketing content affects these valuations. It is hypothesised that there is a premium associated with traceability technologies, which could be particularly true among younger, more educated, and higher-income consumers. Moreover, we compared the effectiveness of video-based content and the static brochure content in boosting WTP, quantifying the potential of multimedia engagement in building trust and conveying complex credence attributes in emerging markets.

This study contributes to both academic and practical discussions on sustainable food systems, international agri-food marketing, and consumer behavior in Southeast Asia. It provides empirical evidence on how transparency and communication strategies influence purchasing decisions in a rapidly modernising food market. For Australian seafood exporters and policymakers, the findings offer actionable insights into how traceability investments and strategic marketing can enhance product differentiation and market penetration for Australian trade in the growing markets in the Asia-Pacific region.

In addition to estimating the marginal WTP for traceability, our analysis explores heterogeneity in preferences and information responsiveness. These insights support the design of targeted marketing strategies and labelling schemes that align with consumer values and risk perceptions. Overall, the study underscores the importance of combining product integrity with effective consumer engagement in international agri-food trade, especially when entering culturally and economically distinct markets with growing middle classes and rising food safety concerns.

Parallel Session: Transition & Transformation

13:20 - 14:40 Wednesday, 11th February, 2026

P Riverbank R8B

Chair: Keisaku Higashida

A Systematic Review of the Environmental and Economic Benefits of Producing and Utilising Green Methanol

Mark Tocock[1], Ali Kiani[2], Claudia Echeverria Encina[2], Darla Hatton MacDonald[3]

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Keywords:

13. Energy and Utilities

30. Value Chain Analysis and Marketing

Paper Abstract:

While advances in renewable energy support broad decarbonisation, hard-to-abate industries continue to present significant challenges. One proposed solution is the use of hydrogen and its derivatives, namely ammonia and methanol. Low-emissions methanol is expected to play an increasing role as the logistical and technical barriers to hydrogen transport and use are addressed. It is also a key precursor for sustainable aviation fuel, currently the most viable short-term option for reducing aviation emissions. However, two key issues affect methanol's perceived environmental and economic benefits. First, as a hydrocarbon, its combustion emits CO_2, necessitating atmospheric CO_2 sourcing to minimise lifecycle emissions. Second, it depends on renewable hydrogen, which remains costly and above the threshold needed to drive substitution from conventional fuels. Given these challenges, this study presents a systematic review of technoeconomic analyses on low-emissions methanol production. Unlike traditional economic assessments, technoeconomic studies integrate engineering detail with cost data. This review focuses specifically on studies using carbon dioxide from technologies such as Direct Air Capture (DAC), excluding biomass-derived CO_2. We aim to answer two key questions: (1) To what extent do these studies account for the environmental impacts of methanol production and use? and (2) What are the projected production costs, including the main cost drivers? We identified 46 studies, of which only five utilised DAC; the remainder relied on CO_2 captured from fuel-combustion activities. Fewer than five studies reported production costs below the current market price of methanol, largely due to the high assumed cost of hydrogen. Based on our analysis, we conclude with a reflection on the potential benefits and limitations of technoeconomic studies in informing firm investment decisions and government policy.

Bridging the Behavioral Gap: How Routine Household Climate Practices Facilitate the Transition to Sustainable Diets

Lan Tran

Lincoln University of Missouri, Jefferson, USA

Keywords:

1. Agribusiness

11. Ecological Economics

Paper Abstract:

The transition to a sustainable agri-food system requires overcoming significant behavioral friction associated with high-carbon consumption patterns, particularly meat. The environmental costs are acute as evidence suggests the livestock industry is a major contributor to greenhouse gas (GHG) emissions, land degradation, and water pollution (Poore & Nemecek, 2018). This strain is compounded by projections that annual meat production will need to reach 470 million tons by 2050 to meet growing global demand (FAO, 2019), crucially placing increasing pressure on a system already strained by its environmental footprint.

This study investigates the behavioral pathways that facilitate the transformation towards sustainable food systems. While some shifts, such as switching from red meat to poultry, have been underway for decades, the broader reduction in overall meat consumption and the widespread adoption of plant-based substitutes remain significant challenges. Our study addresses a core knowledge gap: how do abstract concerns on climate change translate into tangible, resilient dietary behaviors, and what role do everyday household routines play in facilitating this shift? Identifying the specific behavioral pathways and structural barriers is critical for designing effective, economically viable, and equitable transition policies toward a fully decarbonized food system.

We propose a behavioral model where Household Climate Practices (HCPs) act as a mediator, bridging the gap between climate change perceptions (CCPs) and lower-carbon dietary practices (LDPs). The theoretical rationale is that engagement in routine, low-cost climate-friendly action such as recycling, energy efficiency, and waste reduction (HCPs), generates behavioral capital and solidifies “green identity”. This capital reduces the psychological and practical cost of adopting the higher-cost, more demanding action of changing one's diet (LDPs), which we operationalize as reducing overall meat consumption, shifting to lower-carbon meats, and adopting plant-based substitutes.

Using a nationwide U.S. household survey dataset (N = 1,332 eligible observations), we employ a series of ordered logit regression models to measure the associations between individual CCPs, engagement in HCPs, and their LDPs. In addition, formal mediation analysis is applied to establish the behavioral pathway. Furthermore, we account for psychological and behavioral factors (personal self-efficacy, social norms, the familiarity with HCPs, and environmental food purchase) as well as socio-demographic characteristics as control variables.

The results indicate a significant and positive association between abstract climate perceptions and lower-carbon dietary changes, both direct and indirect. Crucially, we find that a clear behavioral pathway is established where a diverse breadth of HCPs plays a mediating role, bridging general climate concerns to practical, lower-carbon diets. Our findings show that

climate justice concerns are uniquely linked with the highest engagement in major dietary changes, suggesting that ethical motivation is key to overcoming the cognitive costs of high-effort dietary shifts. The results also highlight significant demographic heterogeneity. We find a lower likelihood of plant-based adoption among White and rural residents, and complex meat-reduction barriers faced by both high-income and poverty groups across different meat substitution types. These disparities underscore the role of structural and economic friction that decouple ethical concern from adaptive behavior.

Local Preference and Intra-regional Trade Barriers: Evidence from Rice in China's Middle–Lower Yangtze

Juyin Zhu, Jintao Zhan

Nanjing Agricultural University, Nanjing, China

Paper Abstract:

Building a unified national market and dismantling regional trade barriers are crucial for developing the crop seed market and safeguarding food security. China operates a crop variety certification system for major crops, with market-entry decisions resting with provincial authorities. Using a unique dataset on rice varieties from the middle–lower Yangtze region spanning 1983–2021, we show that the cultivated area of locally bred varieties is, on average, 2.05 times that of nonlocal varieties, indicating pronounced local preference. Evidence further suggests that administrative gatekeeping at the market-entry stage is a primary driver of this pattern. The local preference is more pronounced in provinces with weaker breeding R&D capacity and in core rice-producing provinces; moreover, it is associated with lower subsequent productivity growth. These findings reveal an underappreciated mechanism by which local preference, operating through market entry, constitutes intra-regional trade barriers under a decentralized regime.

Public acceptance of low-carbon hydrogen production in Australia

Keisaku Higashida[1], Satoshi Yamazaki[2]

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Keywords:

8. Climate Change

13. Energy and Utilities

Paper Abstract:

The urgent need to decarbonise energy systems in order to reduce greenhouse gas (GHG) emissions and mitigate the adverse impacts of climate change is evident. Among various approaches, hydrogen energy gained significant attention as a crucial energy carrier that can contribute to the decarbonisation of energy systems. Despite considerable interest from governments and industries, public attitudes toward hydrogen production remain understudied.

To fill this gap, this study conducts an online survey of the Australian general public to collect information to characterise public acceptance of low-carbon hydrogen production within the country. Australia has developed strategies at both the national and state levels and committed a multimillion-dollar amount to increase the production of hydrogen fuel as part of its transition to a net zero economy by 2050. Therefore, Australia offers valuable insights, particularly in relation to the social licence to operate, for other countries and regions aiming to promote domestic hydrogen production.

Low-carbon hydrogen energy can be produced through various methods. Of these, blue hydrogen and green hydrogen are the two types that have a low GHG emission profile and are sometimes referred to as 'clean' hydrogen. It is widely accepted that both methods contribute to the mitigation of GHG emissions. Additionally, the development of clean hydrogen production projects can have positive economic effects, such as job creation in local communities. However, it is also imperative to consider potential negative consequences associated with clean hydrogen production. For instance, blue hydrogen production relies on fossil fuels, which can undermine the transition to fully renewable energy systems. This dependence also makes hydrogen production vulnerable to fluctuation in international fossil fuel prices. Similarly, green hydrogen production relies on the infrastructure needed for solar and wind power generation, which may disrupt landscapes and raise waste management concerns. Moreover, despite recent rapid technological advancements, there remains uncertainty about the long-term use and economic viability of these low-carbon hydrogen technologies.

Considering the multifaceted implications, it is important to understand public perception of clean hydrogen production as a pathway to promote the decarbonisation of energy systems. For the sustainable development of clean hydrogen production, ongoing public approval and support regarding the energy transition with hydrogen production are crucial. This research examines whether, and to what extent, the Australian public supports clean hydrogen production, and draws policy implications for the transition to low-carbon, renewable energy systems.

Special Session: Technological Pathways to Sustainable Futures: Navigating Rural Transformation in East Asia

15:10 - 16:40 Wednesday, 11th February, 2026

P Riverbank R2-R4

Rural Transformation (RT) is essential for global economic growth and sustainable development, especially in developing nations facing high poverty rates and pressures on agricultural resilience. To advance the UN Sustainable Development Goals (UNSDGs), RT must be accelerated through targeted public investment, emerging technologies (such as life sciences, ICT, and AI), and stronger agricultural-non-farm linkages.

The technological progress driven by the "Fourth Industrial Revolution" has been significant, yet a critical knowledge gap persists in understanding how this progress yields inclusive, equitable, and sustainable outcomes across diverse socioeconomic contexts.

This session directly addresses this by critically examining rural transformation in the Asia-Pacific region. It will focus on how technology, public investment, and policy design can forge pathways toward sustainable and inclusive development, featuring empirical insights from leading academics using comprehensive datasets, including unique household data from China's Research Center for Rural Economy (RCRE). The session provides a vital platform to bridge the knowledge gap between technological advancement and sustainable rural change.

Key Research Topics to be Addressed are the contribution of agricultural technological progress and productivity to economic growth, the effectiveness and targeting of public investments in rural infrastructure and services, the role of digital finance in boosting rural transformation and alleviating financial constraints, the impact of demographic shifts, such as population aging, on agricultural production and sustainability.

Technological Pathways to Sustainable Futures: Navigating Rural Transformation in East Asia

Yu Sheng[1], Ou WANG[2], Jieying BI[3], Pengfei SHI[4], Tong Zhang[5], Xianneng AI[6], Moyu Chen[7]

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Keywords:

8. Climate Change

10. Development Economics

Special Session: From Trees to Reefs: Landholder Preferences for Environmental Programmes Design

15:10 - 16:40 Wednesday, 11th February, 2026

P Riverbank R5

Private landholders play a pivotal role in delivering conservation outcomes, from native tree planting and wetland restoration to biodiversity protection through covenants and the adoption of environmentally friendly farm practices. Understanding landholders' preferences is crucial for designing effective and equitable incentive programmes. This session synthesises recent empirical evidence from Australia and New Zealand. The first presentation reviews landholders' preferences for incentives to support tree planting and wetland restoration, drawing on cross-country comparisons to identify effective policy mechanisms. The second synthesises findings on conservation covenant programmes in Australia, examining motivations, barriers to participation, and lessons for long-term policy design. The third presentation focuses on drivers of farmer adoption of practices that reduce sediment and nutrient runoff to the Great Barrier Reef, highlighting the role of incentives and trade-offs faced by landholders. Collectively, the session will provide comparative insights to inform the design of conservation policies across contexts. The session concludes with a discussion of common themes, methodological challenges, and policy implications across these contexts. Format: The session will feature three synthesis-style presentations, each lasting 20 minutes. This will be followed by a 25-minute moderated discussion. The discussion aims to uncover lessons on incentive design, landholder heterogeneity, and methodological approaches. Audience participation will be encouraged through Q&A and an open dialogue about opportunities for comparative and collaborative research across regions and ecosystems. This format is intended to emphasise connections between case studies, foster critical reflection, and inspire ideas for future research and policy.

Presenter 1: Maksym Polyakov (Bioeconomy Science Institute, NZ). Presentation: "Landholders' Preferences for Incentives for Native Tree Planting and Wetland Restoration in New Zealand and Australia".

Presenter 2: Md Sayed Iftekhar (Griffith University). Presentation: "Preferences for Conservation Covenant Programs in Australia: A synthesis".

Presenter 3: John Rolfe (Central Queensland University). Presentation: "Drivers of Farmer Adoption to Reduce Environmental Impacts on the Great Barrier Reef".

Moderator: Sorada Tapsuwan (Swinburne University).

From Trees to Reefs: Landholder Preferences for Environmental Programmes Design

Maksym Polyakov[1,2], Md Sayed Iftekhar[3], John Rolfe[4], Sorada Tapsuwan[5]

[1]Bioeconomy Science Institute, Auckland, New Zealand. [2]The University of Western Australia, Perth, Australia. [3]Griffith University, Brisbane, Australia. [4]Central Queensland University, Rockhampton North, Australia. [5]Swinbourne University, Melbourne, Australia

Presentation Type:

2. Special Session

Keywords:

14. Environmental Economics

21. Land and Natural Resource Management

Special Session: Agri-Food Resilience: Policy, Trade, and Climate

15:10 - 16:40 Wednesday, 11th February, 2026

P Riverbank R6

This timely session brings together a diverse panel of economists from leading U.S. and Australasian institutions to analyze pressing and contemporary issues impacting the agri-food systems of the United States and Australia. Centered around on the themes of trade and other policy, agricultural markets, farm labor, and climate resilience, the session will highlight shared challenges and opportunities across the Pacific.

The session will feature six focused lightning presentations followed by a panel discussion by economists from U.S. and Australian institutions, who are diverse in their career stages and areas of expertise. This integrated approach will provide a foundation for an impactful discussion on future research priorities relevant to the most significant agri-food policy questions facing the U.S. and Australia.

Alexandra Hill (UC Berkeley) is an assistant professor of cooperative extension with expertise in agricultural labour, industrial organization, and supply chain management. She will present research applying a new partial equilibrium modelling framework – SIMPLE-G-LABOR – on the implications of alternative immigration policy scenarios for farm labour supply, U.S. agricultural production, and global trade.

Daniel Scheitrum (Cal Poly) is an associate professor whose research examines the economic and financial impacts of agricultural and energy policy. He will present research on market concentration in the California cannabis market and its barriers to access, while discussing implications for other countries and contexts considering how to regulate and govern newly emerging cannabis markets.

Aleks Schaefer (Oklahoma State) is an associate professor whose research focuses on the impacts of law and policy on agriculture and food markets. He will present research on the short- and long-run economic impacts of the Chinese import ban on Australian beef.

Margaret Jodlowski (Ohio State) is an assistant professor with expertise in agricultural finance, agricultural risk management, and agricultural labour economics. She will present research that explores whether wage-setting policies and institutional wages drive wage compression in agricultural labour markets.

David Ubilava (USYD) is an associate professor with expertise in food and agricultural markets, climate, and conflict. He will present research on conflict as the risk factor and the determinant of the vertical price transmission and storage puzzle in Africa.

Joey Blumberg (USFS) is an ORISE postdoctoral research fellow whose research program focuses on the economics of water scarcity, climate change, and environmental disturbance. He will present research on a new ecosystem portfolio approach to optimize conservation management decisions on landscapes that provide surface water runoff for drinking water supplies and irrigated agriculture.

Agri-Food Resilience: Policy, Trade, and Climate

Alexandra Hill[1], Daniel Scheitrum[2], Aleks Schaefer[3], Margaret Jodlowski[4], David Ubilava[5], Joey Blumberg[6]

[1]University of California, Berkeley, Berkeley, USA. [2]California Polytechnic State University, San Luis Obispo, USA. [3]Oklahoma State University, Oklahoma City, USA. [4]The Ohio State University, Columbus, USA. [5]University of Sydney, Sydney, Australia. [6]United States Forest Service, Fort Collins, USA

Keywords:

23. Market Design and Policy

25. Policy Analysis

Special Session: The Consumer Experience in Food Markets: Results from the Consumer Food Insights Survey in Australia and the US

15:10 - 16:40 Wednesday, 11th February, 2026

P Riverbank R6B

Transformations in agri-food systems are being driven not only by energy and environmental challenges but also by consumer choices, dietary preferences, food values, and food perceptions. The Consumer Food Insights (CFI) Survey, now implemented in both Australia and the United States, offers a unique, parallel dataset to explore these issues.

The Center for Food Demand Analysis and Sustainability at Purdue has been conducting the CFI every month since 2022 to measure consumer food behavior, diet quality, food security, consumer trust, and sustainability in the United States. In September 2025, CFDAS collaborated with researchers from Flinders University to simultaneously conduct the survey in Australia and the U.S., allowing insights into the food consumer experience in Australia, as well as cross-country comparisons.

The proposed 2026 AARES session, Food for Thought: Cross-Country Results from the Consumer Food Insights Survey in Australia and the U.S., will highlight and discuss consumer food behaviors that are crucial for the transformation and sustainability of agri-food systems. Specifically, the panel will present comparative findings on diet quality and attitudes toward sustainable and healthy food in Australia vs. the U.S.; examine differences in consumer food behavior, values, food spending, environmental responsibility, and trust in food systems; explore water use, drought experiences, and attitudes toward climate change and water security, linking consumer perspectives to environmental and energy system stresses; and discuss food security patterns, including the extent of food hardship, dietary composition, and coping strategies across both countries.

The session directly addresses AARES 2026's theme "Transformations in Energy, Agri-Food and Environmental Systems" by illustrating how consumer-level food insights shape and reflect agri-food and environmental transitions. Cross-country perspectives enrich our understanding of how social, economic, and environmental contexts matter for consumer food behavior, providing evidence for policymakers, industry, and researchers on how best to support resilient and sustainable food systems.

The Consumer Experience in Food Markets: Results from the Consumer Food Insights Survey in Australia and the U.S.

Joseph Balagtas[1], Elijah Bryant[1], Alec Zuo[2], Elizabeth Galanis[2], Ahmad Wahdat[1]

[1]Purdue University, West Lafayette, USA. [2]Flinders University, Adelaide, Australia

Keywords:

17. Food, Health and Nutrition

Special Session: Food system governance: Regional and National Food Strategies in Australia and Aotearoa New Zealand

15:10 - 16:40 Wednesday, 11th February, 2026

P Riverbank R8

Against the background of the Feeding Australia Strategy and the calls in New Zealand for a National Food Strategy, this session will explore the development and implementation of national and regional/local food strategies in Australia and New Zealand. It will highlight different approaches to policy, planning, and practice, with a focus on how strategies can support sustainable, resilient, and equitable food systems.

The session will provide comparative insights from both countries, examining how local contexts interact with national priorities and what lessons can be shared across regions. Key themes include: The role of civil society in food policy and strategy; The interactions and tensions between National (top-down) and Regional/Local (bottom up) food strategies; The importance of understanding foodscapes in regional food strategies and; Incorporating indigenous values and principles in local food strategies. The Special Session will be structured with four invited presentations (15 minutes each), followed by a facilitated panel discussion and audience Q&A.

The discussion will focus on: a) Points of convergence and divergence between Australia and New Zealand and also between national and regional approaches. b) Practical challenges in developing and implementing food strategies and the role of foodscapes. c) Opportunities for collaboration between research, civil society, and national and local government. The session will be chaired by Professor Alan Renwick (Lincoln University) and will bring together speakers from Australia and New Zealand from both Academia and Civil Society.

The planned speakers and topics are: 1) Nick Rose (Director Sustain Australia): The Role of Civil Society in Food Strategy and Policy. 2) Katherine Trought (Lincoln University): Learning from National and Local Food System Strategies. 3) Dr Peggy Schrobback (CSIRO Agriculture and Food): Feeding South East Queensland: A Foodscape Perspective. 4) Miriana Stephens (Wakatu Incorporation): Incorporating Māori Values and Principles in a Regional Food Strategy: Insights from Te Tauihu.

Food system governance: Regional and National Food Strategies in Australia and Aotearoa New Zealand

Alan Renwick[1], Nick Rose[2], Peggy Schrobback[3], Katherine Trought[1], Miriana Stephens[4]

[1]Lincoln University, Christchurch, New Zealand. [2]Sustain, Melbourne, Australia. [3]CSIRO, Brisbane, Australia. [4]Wakatu Incorporation, Nelson, New Zealand

Presentation Type:

2. Special Session

Keywords:

17. Food, Health and Nutrition

25. Policy Analysis

Special Session: Crisis in the wine industry: indicators, causes, ways forward

15:10 - 16:40 Wednesday, 11th February, 2026

P Riverbank R8B

Wine consumers in many countries, especially Australians, have never had it so good: an ever-widening range of wines is on offer and, apart from the most iconic wines, their real prices are at record lows while their quality is continually improving. Many vignerons, by contrast, are struggling to make a profit. What is the nature and extent of this unsustainable situation? How did it come about? What can be done to speed adjustment toward a more stable demand-supply balance? What will it look like? These and related questions are the focus of this Special Session. While some of the causes are cyclical, many are structural. They're coming from both the demand and the supply sides of the market. Some are global; others are specifically Australian. Global demand ones include a decline in alcohol consumption in some markets (What's behind it? How badly is it affecting wine sales?) and geopolitical disruptions including tariff shocks. Global supply pressures come from chronic over-production in the EU thanks to government supports in the face of declining domestic demand, the rapid export-led supply explosion in key New World countries, and climate challenges. Australian vignerons are suffering more than most, however – and their supply responses to low profitability have been far slower than, for example, California's.

The session will begin with ***Kym Anderson*** providing an overview of the crisis the industry is facing in Australia and elsewhere, drawing on and updating material in a 2024 Independent Review he was asked to prepare for Australia's Federal and State Ministers of Agriculture (20 minutes).

Fine wine producer and former President of the Winemakers Federation of Australia, ***Brian Croser***, will open the discussion, reflecting on the 30-year strategic plan launched by the industry in 1996 and on what is now needed to ensure the industry reaches a sustainable new equilibrium (10 minutes, followed by 10 minutes Q&A).

Three short paper presentations will follow (each 15 minutes including brief Q&A). The session will end with the announcement of a new International Wine Economic Research Consortium (IWERC) being led by and for the benefit of early and mid-career researchers.

The three shorter paper presentations (presenter is underlined) are as follows:

by ***Julian M. Alston (UC Davis) and Sarah C. Whitnall (UWA)***

Systematic discrepancies between the "stated" alcohol content of wine as reported by the producer, on the label, and the "actual" alcohol content as measured by Canada's Liquor Control Board of Ontario (LCBO) were exposed by Alston et al. (2015). Drawing on their analysis of over 90,000 observations of individual wines tested by the LCBO, Alston et al. reported two

main findings. First, over the 18 vintage years 1992–2009, the alcohol content of the wines trended up, with an overall average increase of about 0.5 percentage points on a base of 12–13% alcohol by volume (ABV). Second, labels tended to understate the alcohol content for higher-alcohol wines and, conversely, to overstate the alcohol content for lower-alcohol wines. We extend the work by Alston et al. (2015) in three ways: (1) we extend the database to 2024 to include data for 15 more vintages and more than 200,000 additional observations; (2) our statistical analysis takes explicitly into account the country-specific details of labelling laws, in particular the EU requirement to report alcohol percentage rounded to the nearest 0.5% ABV; and (3) we consider variety-specific effects and, specifically, ask if there are systematic differences between Pinot Noir (or regions where Pinot Noir predominates) and other varieties (or regions where other varieties predominate) in terms of both the trend alcohol content and the propensity to over- or under-state the alcohol content.

by ***Glyn Wittwer (Victoria University) and Kym Anderson (Adelaide University and ANU)***

The announcements in August 2025, of additional tariffs on US imports of other countries' goods, and responses by partner countries, are impacting total and bilateral trade flows non-trivially, including through their dampening of consumer confidence. This article estimates their likely effects on trade in alcoholic beverages, using a global model of national beverage markets. Various scenarios are compared. The first is the most important, namely the 15% tariff hike on US imports of beverages from the European Union. Its global trade-reducing impact is amplified by the EU's response to the hike in US tariffs. In the second scenario involving US tariff hikes on the rest of the world and their responses, most countries' wine exports would shrink, but exports of beer and spirits would expand for some countries thanks to the trade divergence generated by the varying tariff hikes. If the increasing uncertainty associated with these trade war developments led to a cumulated 2% drop in consumer spending relative to what it would otherwise have been, virtually all wine-exporting countries would sell less wine to both the US and the rest of the world, as wine trade destruction would outweigh trade diversion.

by ***Kym Anderson (Adelaide University and ANU) and German Puga (UWA)***

Over the past 35 years the mixes of winegrape varieties (in terms of vineyard bearing area) in the various wine regions of the world have changed substantially. To what extent have they responded to climate change and changing consumer preferences? This paper reports on a newly updated global database involving 700+ wine regions that account for 99% of the world's winegrape vineyard area and 1,700+ DNA-distinct prime winegrape varieties and 1350+ synonyms, for 2000, 2010 and 2023 and earlier national data for 1990. It shows that vignerons' winegrape varietal choices are narrowing in the various wine-producing countries of the world by converging on the major 'international' varieties, especially French ones. This is not inconsistent with the fact that wine consumers are enjoying an ever-wider choice range, thanks to far greater international trade in wine associated with the current wave of globalization. Nor is it inconsistent with strengthening vigneron interest in 'alternative' varieties. But it is not

consistent with the recent drift in consumer demand away from red wines, nor with the changes in regions' climates.

This Special Session will end with a brief announcement by ***German Puga*** of a new International Wine Economic Research Consortium (IWERC), which is being led by and for the benefit of early and mid-career researchers who will be encouraged to join this network.

Crisis in the wine industry: indicators, causes, ways forward

Kym Anderson[1], Brian Croser[2], Sarah Whitnall[3], Glyn Wittwer[4], German Puga[3]

[1]Adelaide University, Adelaide, Australia. [2]Vigneron, Adelaide, Australia. [3]UWA, Perth, Australia. [4]Victoria University, Melbourne, Australia

Keywords:

20. International Trade

32. Wine and Horticultural Systems

Presidential Address by Professor Jeff Connor: The Productivity and Wellbeing Value of Collegiality, Cooperation, and Collaboration

16:50 - 17:40 Wednesday, 11th February, 2026

P Riverbank R2-R4

Adam Loch Memorial

17:40 - 17:50 Wednesday, 11th February, 2026

P Riverbank R2-R4

Thursday 12th February

Parallel Session: Consumer Choice & Food

08:30 - 09:50 Thursday, 12th February, 2026

P Riverbank R2-R4

Chair: Kynda Curtis

When Channels and Sellers Shape Green Choices: Evidence from Chinese Rice Consumption

YUE CHEN, Michael Burton, Chunbo Ma, Claire Doll

The University of Western Australia, Perth, Australia

Keywords:

9. Consumer Choice

11. Ecological Economics

17. Food, Health and Nutrition

Paper Abstract:

Chinese consumers face an increasingly complex multi-channel shopping environment that now includes live streaming, traditional online, and offline formats. These channels differ not only in how product information is conveyed but also in who provides it, leading to varying levels of information asymmetry and trust that can influence consumer choices. Understanding how consumers choose among multiple channels is therefore increasingly important. However, existing studies on multichannel consumer choice have mainly focused on two channels, such as offline versus traditional online shopping or traditional online versus live streaming. Research on comparing consumer preferences across offline, traditional online, and live streaming formats remains limited. This study examines how consumer preferences for two types of Chinese eco-labelled rice products (Green Food and Organic labels) vary across these channels. Eco-labelled products are particularly prone to issues of information asymmetry and trust. To ensure realism and policy relevance, three shopping channel attributes in our study were designed to reflect common purchasing options available to Chinese consumers. For offline shopping, we included both farmer markets and supermarkets, which remain the dominant offline sources of food purchases in China. For traditional online platforms, we captured the widespread use of e-commerce apps and websites. For live streaming shopping, we distinguished between sessions led by celebrity streamers and those led by rice experts or farmers, reflecting two forms of live streaming that differ in the characteristics of the streamers. Based on a discrete choice experiment with 933 Chinese consumers and using a mixed logit model and a latent class model, our results reveal substantial heterogeneity in channel preferences associated with eco-labels. The mixed logit results show that consumers prefer

conventional rice products from supermarkets. In contrast, for eco-labelled products (both green-labelled and organic-labelled rice), they shift their preferences toward traditional online, farmer markets, and farmer or rice expert live streaming shopping channels. We also find that celebrity streamers are generally not preferred for eco-labelled products compared to farmer or rice expert streamers. The latent class analysis further reveals that nearly half of our respondents do not place significant weight on cost when they make purchasing decisions. Instead, their preference for eco-labelled rice products is primarily guided by differences across shopping channels. Our findings provide important implications for policymakers and producers in promoting eco-labelled product consumption more effectively and expanding consumer demand by tailoring shopping channels and seller characteristics.

When Apps Meet Grapes: An Exploratory Study of Wine Consumption and Knowledge in Taiwan

Normalyn Longay[1,2], Shang-Ho Yang[1]

[1]National Chung Hsing University, Taichung City, Taiwan. [2]Benguet State University, La Trinidad, Philippines

Keywords:

9. Consumer Choice

32. Wine and Horticultural Systems

Paper Abstract:

The agri-food system is generally shaped by the interplay of various factors, including social, economic, environmental, political, and technological innovations. However, transformation in the system comes with understanding how the factors interact. For instance, in Taiwan, wine consumption has been increasing in recent years, driven not only by changing tastes and preferences but also by the rapid adoption of digital platforms, which can provide product information and support. This is crucial to sustain a competitive and adaptive agri-food network. Despite these tools, limited research has examined how digital applications drive purchase decisions in the Taiwanese wine market. This study investigates these dynamics, focusing on how digital apps, consumers' wine knowledge, and socio-economic characteristics influence the purchase and consumption of wine.

Data used in the study were drawn from 528 adult wine consumers. To analyze the determinants of wine purchase, Tobit models, marginal effects, and negative binomial regression were applied. Tobit regression results indicate that income, star ranking, and frequency of wine drinking have a positive impact on wine purchase. At the same time, gender and age exhibit a negative association, highlighting generational differences in consumption patterns. Marginal effects estimates reveal that, on average, higher income, accompanied by greater wine knowledge, significantly increases the probability of purchasing wine for home consumption and as a gift. The sources of information include social media, as well as family and friends. The negative binomial regression confirms these patterns and additionally provides rate ratios. Digital applications, such as Vivino, have a significant impact on wine consumption.

This finding underscores the growing significance of digital information channels as decision-making tools in contemporary agri-food markets. While traditional sources of wine knowledge, such as WSET certifications, contribute to consumer understanding, digital apps provide real-time information that directly informs purchasing behavior.

The findings fill a gap in the literature by providing empirical evidence on the interaction between consumer knowledge and digital apps in an East Asian context. Further, the results contribute to the literature by integrating models to quantify the influence of digital tools on wine consumption. It addresses a gap in understanding how digital tools shape consumer choices in high-value agri-food products, providing evidence for researchers and stakeholders. For the wine industry, these insights suggest that enhancing digital content and support can stimulate demand, particularly among younger and higher-income consumers. For policymakers and educators, the findings underscore the importance of digital literacy and consumer education in fostering informed consumption within evolving agri-food systems.

The study demonstrates that knowledge on wine, digital application, and socio-economic factors are mediators of wine consumption behavior in Taiwan, influencing both the decisions to purchase and the frequency of purchases. The results align with broader transformations in energy, agriculture, and environmental systems, highlighting the interplay between digital innovation and consumer behavior in shaping food markets.

Towards Socially Optimal Agriculture with Food Value: Mutual Imperfect Information between Farmers and Consumers and the Case of Pesticide Use

Hiroki Kiriyama[1], Hirotaka Matsuda[2]

[1]Graduate School of Agriculture, Tokyo University of Agriculture, Atsugi, Japan. [2]Faculty of Agriculture, Tokyo University of Agriculture, Atsugi, Japan

Keywords:

9. Consumer Choice

15. Farm Management and Farmer Behaviour

Paper Abstract:

Introduction

Agricultural production relies on multiple inputs to supply food to consumers. Nitrogen fertilizers and pesticides are indispensable, yet they generate negative externalities. Conservation agriculture and organic farming can reduce these impacts, but adoption remains limited. In principle, supply and demand equilibrium in competitive market should deliver both Pareto and social optimality. If consumers' willingness to pay truly reflected the social value of agricultural practices that reduce negative externalities from input use, and if farmers adjusted production based on actual demand, socially optimal agriculture could be realized. In practice, however, such alignment is rare, as mutual imperfect information persists: farmers misperceive consumers' actual preferences, while consumers hold limited and often inaccurate understandings of farmers' production practices. This generates a market equilibrium in which

both supply and demand are based on imperfect information, resulting in a persistent departure from socially optimal input use. While existing studies typically examine consumer and farmer behavior separately, few have directly compared their perceptions and predictions.

Purpose

This study aims to clarify the mutual imperfect information between farmers and consumers. Specifically, we examine (1) the discrepancies between consumers' actual preferences when purchasing agricultural products and farmers' predictions of those preferences, and (2) the discrepancies between farmers' prioritization of production practices regarding pesticide use and consumers' perceptions of these production priorities.

Methodology and Data

We employ best–worst scaling (BWS) to analyze two types of discrepancies between farmers and consumers. The Food Values framework proposed by Lusk and Briggeman (2009) provides the attributes for consumer preferences. We elicit "best" and "worst" choices for the factors prioritized by consumers in Japan when purchasing agricultural products, together with farmers' predictions of those consumer priorities. In parallel, we investigate farmers' prioritization of production practices regarding pesticide use, as well as consumers' predictions of these farmer priorities. Conditional logit models are estimated using maximum likelihood methods to analyze the BWS responses. Data were collected through a postal survey of 87 rice farmers and an online survey of 250 consumers in Japan.

Results and Discussion

The estimates reveal a pronounced divergence between consumers and farmers. Consumers assign the highest utility weight to safety, followed by price, nutrition, and taste. Farmers, however, predict that consumers place the greatest importance on price, with other attributes perceived as far less important. Regarding pesticide practices, consumers believe farmers prioritize cultivating pest-resistant varieties, whereas farmers assign relatively low importance to this practice.

These findings demonstrate clear discrepancies between consumers' preferences and farmers' perceptions, as well as between farmers' production priorities and consumers' perceptions of those priorities. Addressing these discrepancies is essential for moving agricultural production closer to social optimality. Consumers need a more accurate understanding of farmers' production practices, while farmers must respond more precisely to actual consumer demand. Policy measures, improved communication mechanisms, and certification schemes may help bridge these discrepancies and promote input use consistent with both market efficiency and social optimality.

Reference

Lusk, J. L., & Briggeman, B. C. (2009). Food values. American Journal of Agricultural Economics, 91(1), 184–196.

Who Says Less is More? US Consumers Prefer Two Labels Over One on Value-Added Foods. Improving Their Understanding Helps Too!

Kynda Curtis, Tatiana Drugova, Karin Allen

Utah State University, Logan, USA

Keywords:

9. Consumer Choice

30. Value Chain Analysis and Marketing

Paper Abstract:

Objectives

This study assesses consumer preferences and willingness to pay (WTP) for local value-added or processed foods with specialty labels. Sub-objectives include evaluating the impact of multiple labels and the effect of improving consumer knowledge of certification programs on WTP across different food categories.

Background

The local foods movement in the U.S. West is supported by the region's diverse agriculture, including fruits, vegetables, meats, dairy, honey, and other specialty products. Cottage food laws in many states encourage small-scale entrepreneurship by allowing sales of homemade products. However, consumer acceptance of local processed foods remains uncertain, particularly around food safety and quality. Building consumer trust requires assurances such as transparent sourcing and certifications that signal both authenticity and safety.

Methods

An online survey was conducted in late 2024 across the U.S. West with 1,150 responses. The survey collected data on socio-demographics, shopping habits for processed foods, familiarity with labeling programs, and food-related behaviors. Respondents participated in choice experiments evaluating WTP for three products: an 8 oz. package of beef jerky, a 16 oz. bottle of mild salsa, and a 32 oz. bottle of tart cherry juice. These were selected due to availability of raw products in the region and their popularity with small processors. Four labels—certified organic, local, grass-fed, and non-GMO—were tested. Respondents could opt to view definitions of the labels of which 45% did so. Random parameter logit models were used to calculate WTP for each product and label, both for the full sample and for the information versus no-information groups.

Results

Familiarity with the specialty labels was generally low, with only 25% of respondents reporting strong knowledge. Grass-fed standards were the most recognized, while local foods were consumed somewhat more frequently. Salsa was the most widely consumed product, with 26% eating it several times a week or more, followed by beef jerky at 16%. Tart cherry juice was least common—54% had never tried it, and only 13% consumed it regularly.

Average expenditures per purchase were $13.63 for beef jerky, $10.75 for salsa, and $9.15 for cherry juice. Respondents who chose to view label definitions (Yes Information group)

consistently showed higher WTP across all products and labels. Those declining definitions (No Information group) generally had lower WTP, except for organic and non-GMO salsa. For tart cherry juice, the Yes Information group's WTP exceeded the No Information group's by $1.06–$2.32 per bottle; for salsa, by $0.33–$1.24; and for beef jerky, by $1.72–$3.70.

Dual labels consistently generated higher premiums than single labels, ranging from $2–$6 more per item. Organic labeling was most valued overall, except for beef jerky, where grass-fed was preferred.

Findings

Results demonstrate that combination labeling strongly influences consumer choice and that information provision significantly raises WTP. Food industry stakeholders may benefit from dual-label strategies, such as combining organic with local or grass-fed, and from targeting consumers who actively seek label information. These strategies can increase consumer trust, support local producers, and expand market opportunities for specialty processed foods.

Parallel Session: Carbon & Nature Markets

08:30 - 09:50 Thursday, 12th February, 2026

P Riverbank R5

Chair: Brent Sohngen

Optimising Wildlife Corridor Connections with Payments for Ecosystem Services

Valerie Seidel, Daniel Dourte, Laila Racevskis

The Balmoral Group, Florida, USA

Keywords:

7. Carbon and Nature Markets

14. Environmental Economics

21. Land and Natural Resource Management

Paper Abstract:

The Florida Wildlife Corridor Act was signed into law by the Florida Legislature in 2021, establishing 18 million acres of Florida as the Florida wildlife corridor for the purpose of creating incentives for conservation and sustainable development[1]. About 3.2 million hectares are yet-to-be conserved and are considered Opportunity Areas, which if conserved in perpetuity, would help secure long-term critical habitat connections throughout the state. Despite record amounts of public funding in recent years to acquire lands within the wildlife corridor, properties may remain on the acquisition list for nearly a decade, and landowners frequently cannot afford the lengthy delay. Absent protection, forecasts show another 1.4 million hectares will likely be lost to development, displacing an estimated $3.5 billion in ecosystem services annually[2].

To forestall this rapid conversion, a Payments for Ecosystem Services program (PES) was developed to provide private landowners financial incentives to provide specified ecosystem services on their land, such as wildlife habitat, flood control, biodiversity, and aquifer recharge. A variety of PES approaches had previously been attempted throughout the state, but for various reasons, little meaningful uptake had occurred outside of large flood control projects.

In the work to be presented, we will discuss the process used to successfully design and implement a Corridor PES. A first step was enlisting a Technical Advisory Committee (TAC) of landowners, conservation experts, and influential peak bodies. The TAC was clear from the outset that the PES must be simple, transparent, and reflect market realities. Existing, long-vetted geospatial data (maps) were used as the baseline for estimating relative ecosystem provision.

A literature review and broad stakeholder engagement were conducted to identify the factors underpinning past PES programs, and which contributed to success or failure. The findings were

used to support recommended program design elements, which were further refined with TAC input. Contracts are ten years long, with annual monitoring and compliance checks. The framework was designed for flexible inclusion of ecosystem services; ultimately, three ecosystem services were included for the first round of applications.

Existing literature and cost-share programs were used to assign monetary values to high, medium and low levels of ecosystems, on a per-acre, per-year basis. The resulting framework was used to support a funding request from the Department of Defense and the Department of Transportation for pilot funding. Ultimately the request was successful in obtaining $4.8M (AUD), of which half is match through wildlife crossings under main transportation motorways.

The presentation will cover key program design elements and their rationale based on the research, implications for other wildlife corridors, and insights on funder appetite and requirements.

[1] Chapter 2021-181, Laws of Florida; Section 259.1055, Florida Statutes

[2] Carr, M.H. and P.D. Zwick, 2016. Technical Report: Florida 2070 – Mapping Florida's Future – Alternative Patterns of Development in 2070. https://1000friendsofflorida.org/florida2070/wpcontent/uploads/2016/09/florida2070technicalreportfinal.pdf

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Developing & trialling approaches for Environmental Economic Accounting to ensure respectful inclusion of First Nations knowledges

Diane Jarvis[1], Silva Larson[2]

[1]James Cook University, Cairns, Australia. [2]University of Sunshine Coast, Sippy Downs, Australia

Keywords:

7. Carbon and Nature Markets

11. Ecological Economics

Paper Abstract:

This project advances the integration of First Nations knowledges into the United Nations System of Environmental-Economic Accounting Ecosystem Accounting (SEEA EA) through a deeply collaborative and co-designed approach. SEEA EA offers a structured framework for organizing data on ecosystem extent, condition, and service flows, which has been tested across a range of contexts. However, it has yet to be demonstrated in practice (i) how SEEA EA accounts can appropriately reflect the interconnected, reciprocal relationships First Nations Peoples have with Country, and (ii) how SEEA EA can capture the conceptual and methodological foundations of their knowledge systems.

To address these gaps, we partner with two First Nations groups—Tagalaka Aboriginal Corporation in north Queensland and Esperance Tjaltjraak Native Title Aboriginal Corporation in Western Australia—to co-design SEEA EA accounts that are culturally grounded, representative,

and useful for decision-making. Central to this work is the co-design of methods to understand, measure and represent First Nations perspectives on ecosystem extent and condition which underpin 'healthy Country', in addition to the flow of services between people and Country.

Rather than applying predefined categories from western ecological science, each of our First Nations partners will define Country through their own conceptual frameworks—whether by biophysical features, culturally significant species, or other locally and culturally meaningful descriptors. Flow accounts will similarly be co-developed to reflect values embedded in custodianship, including provisioning, regulating, and cultural services, as well as flows related to caring for Country. The co-design process also extends to data collection methods, ensuring these are culturally appropriate, locally relevant, and capable of capturing both qualitative and quantitative dimensions of people–Country relationships. This participatory approach enhances the relevance of the accounts and contributes to methodological innovation in ecosystem accounting.

By trialling the production of full SEEA EA-compliant accounts derived from First Nations knowledge systems, the project marks a significant shift from previous efforts that relied heavily on western science inputs. That is, information from the Australian Government's National Ecosystem Accounting Project, alongside nature repair market and nature-based solutions initiatives, may be leveraged as complementary data sources but will not provide primary inputs for this work.

Ultimately, the project aims to develop transferable guidelines for co-development of ecosystem accounts with First Nations groups, supporting broader application across diverse cultural and geographic contexts, and contributing to more inclusive and effective environmental-economic decision-making, at local, regional, and national scales.

In this paper we present our co-design process, including the methods and approaches that have emerged from the co-design with our project partners. We explore the effect of contextual and geographic differences between our two partners, and provide learnings for future SEEA EA projects that seek to respectfully include First Nations knowledges within (stock and flow) accounts for their traditional Country.

Transforming Peatland Management in Indonesia: Integrating Agri-Food Production and Climate Services

Sri Lestari

Australian National University, Canberra, Australia

Keywords:

7. Carbon and Nature Markets

8. Climate Change

Paper Abstract:

Indonesia's tropical peatlands are among the world's most significant carbon storage sites, but are increasingly threatened by recurring fires, land conversion for drainage-based agriculture,

and land subsidence. Peatland management paradigms typically segregate the restoration of degraded peatlands from the development of agri-food production, often leading to conflicting goals and limiting the scalability of sustainable interventions. This paper investigates an integrated peatland management framework in Central Kalimantan, implemented by a restoration company, that combines climate services with specific agri-food production to support peatland restoration, reduce emissions, and enhance rural community livelihoods. Emphasising on community engagement and development, the restoration company encourages communities to participate in the peatland restoration program while simultaneously utilising it to provide more feasible livelihoods. This strategy and the incentive mechanisms have ecological, economic, and social impacts. Reducing fire risk and incorporating local climatic knowledge into crop selection and planting timing can potentially optimise land use on degraded peatlands. Empirical findings from the research sites indicate that interventions designed jointly by the restoration company and communities living around peatland areas improved ecosystem services while maintaining land productivity to support community food security. In shallow peat areas, communities can develop crops among timber plants. Meanwhile, in deep peat areas where villagers have obtained village forest management permits, they can rely on non-timber forest products, mainly fish, to generate cash income. This study underscores the need for cross-sector policy coherence, collaboration and information sharing among stakeholders, as well as long-term investment to enable the transition to environmentally friendly agri-food systems while supporting the sustainability of peatland restoration programs amidst climate change.

Identifying and Valuing Non-Passive Carbon Sequestered in the World's Forests

Brent Sohngen[1], Roberto Kimura[1], Alla Golub[2], Adam Daigneault[3], Eric Davis[4]

[1]Ohio State University, Columbus, USA. [2]Purdue University, West Lafayette, USA. [3]U. of Maine, Orono, USA. [4]USDA-ERS, Kansas City, USA

Keywords:

7. Carbon and Nature Markets

8. Climate Change

Paper Abstract:

Recent studies have argued that much of the world's forest carbon sink is passive, largely the result of carbon fertilization and climate change[1]. However, the area of planted forests has increased to 300 million hectares[2]. Wood volume in planted forests has also increased over time, due in part to management efforts[3,4]. Many forests in temperate regions are managed for timber and other purposes, relying on approaches that facilitate natural regeneration. Increasingly, forests have regrown on abandoned agricultural lands in tropical regions, amounting to 540 million hectares today[5]. As a result of the many human incursions in forests, including tree harvesting, tree planting, and the intensification of management, it is important to assess and value the extent to which direct human influences versus passive ones have driven observed increases in carbon storage[6].

This paper combines historical Dynamic Global Vegetation Model (DGVM) results[7] with a dynamic economic model of the global forest sector[8] to assess how carbon fertilization and climate change have influenced forest growth and dieback. We use results for the historical period 1900 to 2020 from two DGVMs (MC2 and LPJ) to calibrate growth and yield functions and fire driven dieback. We use the resulting yield functions and annual dieback in the economic model and calibrate model to observed historical harvesting levels [9], timber prices, and forest areas[11]. Using the model, we conduct a series of counterfactual tests that exclude the effects of CO_2 fertilization, climate change, fire suppression, forest management (e.g., increasing planted forests, increasing yields). Briefly, the results illustrate that old growth harvesting over the last century reduced carbon storage, however, the inclusion of human efforts at management have had a substantive impact on the observed flux of carbon in the latter part of the last century and the early part of this century. With the economic model, we disentangle the effects of various human and non-human drivers on wood prices, estimating the contribution of passive and anthropogenic effects on stand value and consumer surplus.

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Parallel Session: Marine Systems & Development

08:30 - 09:50 Thursday, 12th February, 2026

P Riverbank R6

Chair: Wellem Anselmus Teniwut

Salinity, Shocks, and Shifting Livelihoods: Ecological and Economic Impacts on Artisanal Fishermen of Chilika Lagoon

Avisweta Nandy[1], Surajit Haldar[2], Debdutt Behura[2]

[1]Sri Sri University, Cuttack, India. [2]Odisha University of Agriculture and Technology, Bhubaneswar, India

Keywords:

11. Ecological Economics

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

Salinity fluctuations in lagoon ecosystems can trigger profound ecological transformations, notably changing the fish species composition and reducing economically viable catch for Artisanal Fishermen (AF) who depend on these resources for their livelihoods. Over the past four decades, AFs in the Chilika Lagoon—Asia's largest brackish water lagoon—have experienced significant shifts in fish catch, attributing these changes primarily to sector-specific salinity variations across the northern, southern, central, and outer channel regions. This study investigates the interplay between environmental and anthropogenic drivers of salinity change that eventually deteriorated the income of AFs. Employing an instrumental variable (IV) regression approach, we establish a positive correlation between salinity levels and AF income, particularly in the outer channel sector, where marine fish species command premium prices in both domestic and international markets. However, this economic advantage is offset by intense competition and ecological vulnerability.

Key transformative events—such as the introduction of shrimp aquaculture in the 1990s by non-AF investors, the artificial mouth opening in 2000, and Cyclone Fani in 2019—have acted as ecological and institutional breakpoints, reshaping biodiversity, governance structures, and social dynamics within the lagoon. To holistically capture these interlinked changes, we apply the Combined IAD-SES (CIS) framework, integrating ecological, social, and economic dimensions to provide a comprehensive blueprint for future interdisciplinary research. Our findings offer valuable insights for policymakers aiming to design resilient and inclusive agri-food systems in coastal and lagoon-based economies undergoing rapid environmental transformation.

Keywords: Artisanal Fishermen, Salinity Dynamics, Chilika Lagoon, CIS Framework, IV Regression

Analysing the effectiveness of the Ultra-poor Graduation Program for small-scale fish-dependent households in Bangladesh

Gouri Mondal[1,2], James Camac[1], Tom Kompas[1]

[1]University of Melbourne, Victoria, Australia. [2]University of Dhaka, Dhaka, Bangladesh

Keywords:

10. Development Economics

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

Despite participating in poverty reduction programs, small-scale fish-dependent households in developing countries continue to face extreme poverty. One such initiative, the Ultra Poor Graduation (UPG) program, has recently expanded to include these communities. This study evaluates the UPG program's impact on fish-dependent households in four impoverished districts of southwestern Bangladesh, using a Difference-in-Differences (DiD) approach. Surveys were conducted for 186 beneficiaries (treatment group) and 265 non-beneficiaries (control group), incorporating questionnaires, focus group discussions, and key informant interviews. In 2019, UPG beneficiaries received material and financial support. By 2023, many were considered “graduates,” meaning they were no longer technically poor. Key indicators assessed included income, expenses, and assets. Both groups showed improvement, though the control group experienced a decline in fisheries income. UPG households saw a greater reduction in extreme poverty, particularly in household expenses. The DiD analysis found significant positive effects on asset values, but not on income or expenses. Respondents cited climate events, pests, and diseases as major threats to income and cost of living. The findings suggest that to be more effective, the UPG program should adopt multidimensional poverty indicators, including those for climate resilience and biosecurity, for sustainable poverty reduction in fish-dependent communities.

Research on the Efficiency and Influencing Factors of Feed Utilization of Aquatic Products in China - From the Perspective of Farmers

Haiqing Zhang, Xiujie Zi, Mengna Zhang

Shanghai Ocean University, Shanghai, China

Keywords:

15. Farm Management and Farmer Behaviour

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

The rapid expansion of aquaculture has catalyzed the evolution of China's aquatic feed industry, intensifying production pressures, particularly regarding the scarcity of protein sources for feed.

Addressing the challenge of enhancing feed utilization efficiency holds substantial theoretical and practical implications for the sustainable development of China's aquaculture sector. Drawing on field surveys conducted by the project team, this paper presents findings from interviews with 382 Penaeus vannamei producers across the provinces of Shandong, Hebei, Jiangsu, and Guangdong from 2017 to 2023. The feed coefficient is employed as a key metric for assessing the feed utilization efficiency. Our research has revealed that: (1) Over the years, the feed coefficient of Penaeus vannamei exhibits a slight downward trend, although the decrease is not significant. (2) Among farming modes, the feed costs associated with factory farming are higher than those for pond farming; however, the difference in feed utilization efficiency between these two is relatively minor. (3) Multiple regression models indicate factors such as educational level, years of farming experience, scale of operations, and the quality of technical services received by farmers all have significant negative impacts on the feed coefficient. Moreover, while the breeding mode has a positive effect, the choice of feed brand and overall feed utilization efficiency negatively influences feed utilization efficiency. (4) The heterogeneity analysis reveals that, within the factory farming model, factors such as gender, educational level, farming density, and the level of technical services significantly negatively impact farmers' feed utilization efficiency. In contrast, within the pond aquaculture model, factors such as years of farming experience, feed brand selection, breeding density, and the level of technical services also demonstrate significant negative effects on feed utilization efficiency. Regional differences significantly influence both factory and pond farming methods. Based on research findings, this paper advocates: prioritizing the development of feed-related technologies, enhancing research on alternative protein sources, and ensuring that technology users and breeders (enterprises) fully understand, master, and effectively utilize new feeding technologies. Secondly, fostering interprovincial technological exchanges can stimulate innovation within the aquaculture sector. Enhanced training in aquaculture techniques is essential to elevate the professional capabilities of practitioners. Finally, bolstering government policy incentives and increasing financial investment and support for aquaculture is crucial to achieving high-level sustainable development in China's aquaculture industry.

Overcoming farm and market level challenges in seaweed farming in the rural small islands region of Indonesia: A leverage point analysis

Wellem Anselmus Teniwut[1,2], Zannie Langford[3], Radiyah Ruhon[4], Fransiskus Resubun[5], Marlina Tawurutubun[5]

[1]School of Agriculture and Food Sustainability, University of Queensland, Brisbane, Australia. [2]Fisheries Agribusiness Study Program, Tual State Fisheries Polytechnic, Langgur, Indonesia. [3]School of Agriculture and Food Sustainability, University of Queensland, Gatton, Australia. [4]Research and Development Center for Marine, Coast, and Small Island, Hasanuddin University, Makassar, Indonesia. [5]Junior Scientific Officer, KONEKSI Project, Langgur, Indonesia

Keywords:

1. Agribusiness

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

Seaweed farming supports the livelihoods of many coastal communities. In the Maluku Province of eastern Indonesia, seaweed production has not recovered to pre-COVID-19 levels despite various efforts and interventions. These interventions are often partial, addressing challenges at either the farm or market level in isolation. Moreover, they are not grounded in empirical evidence of farmers' actions, which reflect both practical responses to constraints and feasible solutions, with each action potentially influencing others. In this study, we examine the interconnected actions undertaken by farmers to identify leverage points that simultaneously address farm- and market-level challenges. We developed an approach to prioritise leverage points based on their potential impact, level of difficulty to implement, and urgency of implementation. Drawing on a participatory framework, system archetypes are derived from a qualitative system-dynamics model and integrated with a formula-based procedure to identify the most critical leverage points. The results revealed five leverage points of intervention, namely farmers' behaviour on farm maintenance and maintaining water quality in the surrounding area of seaweed farming, a consistent supply of propagules, improving farmers' financial assets, and selling price intervention to enhance farmers' productivity and performance. The approach enables the identification of more targeted entry points to address the ongoing productivity and market access challenges.

Parallel Session: Productivity & Change

08:30 - 09:50 Thursday, 12th February, 2026

P Riverbank R6B

Chair: Erdal Karacan

Capturing sub-national variations in achieving sustainable futures in India

Udit Rana[1], Ankit Saha Ahmedabad[1], Sowmiyaa Subramaniam[1], Vartika Singh[2], Ranjan Ghosh[1]

[1]Indian Institute of Management Ahmedabad, Ahmedabad, India. [2]International Food Policy Research Institute, New Delhi, India

Keywords:

26. Practice Change and Adoption

27. Productivity and Efficiency

Paper Abstract:

Achieving global sustainability targets requires granular assessment and action that can translate climate commitments into tailored policies across diverse and interconnected subnational contexts. India's constitutional framework assigns land and agriculture as state subjects, underscoring the limitations of top-down, national-scale analyses for addressing governance needs in the Agriculture, Forestry and Other Land-Use (AFOLU) sector and highlighting the critical importance of context-specific, regionally adapted pathways.

This study addresses critical gaps in subnational agricultural policy analysis by developing state-specific adaptations of the FABLE Calculator to evaluate sustainable pathways to 2050 for two Indian states, namely Bihar and Maharashtra. These states represent contrasting biophysical endowments and socioeconomic trajectories. Bihar is a flood-prone, agriculture-dependent economy with fragmented landholdings that constrain adaptive capacity, while Maharashtra is a drought-prone, industrialised region where high urbanisation creates distinct food system pressures and mitigation needs.

The methodology involved extensive downscaling of the FABLE Calculator (Food, Agriculture, Biodiversity, Land-Use, and Energy Calculator), previously developed for India, to reflect state-level synergies and trade-offs using local databases. Model parameters were refined through iterative calibration using historical data through 2020, incorporating observed trajectories for agricultural production and consumption (both crops and livestock), AFOLU emissions, land-use patterns, ecoregional characteristics, and demographic-economic indicators. We compare two pathways developed for both states: Current Trends (CT), which simulates trajectories under business-as-usual conditions, and Sustainability Pathway (SP), which aligns climate mitigation and adaptation commitments at the national and state level, aligning with several SDGs.

Results demonstrate that achieving sustainability targets requires tailored, region-specific interventions driven by distinct demographic and land-use pressures, while simultaneously prioritising food security by 2050 in the SP. Maharashtra faces critical cropland loss from accelerating urban expansion under CT, as the urban area is set to expand by 79.5% under CT by 2050, leading to a 14% deficit in cropland requirement, threatening food self-sufficiency. SP simulates moderation in urban area expansion while enhancing agricultural productivity to ensure adequate cropland (requiring 13% less cropland and 24.5% less urban area than CT in 2050) without compromising afforestation commitments. Conversely, Bihar's challenge stems from its livestock-dependent agricultural system, which sustains high ruminant density and consequently exerts substantial pressure on available pastureland. High per-capita food requirements, coupled with high ruminant density on constrained pasture, create acute land competition that limits both ecological restoration and development. Under SP, cropland demand can be reduced by 32% compared to CT by 2050, enabling pasture expansion from 18,000 ha under CT to 20,000 ha (~11% increase) to meet livestock production demand. It is imperative to minimise post-harvest losses, diversify production, and improve livestock productivity through feed management and extension services to attain sustainability.

The research highlights the need for differentiated, region-specific approaches that utilise a replicable framework for developing sustainable pathways at the subnational level. Scope remains for immediate application to other Indian states and broader relevance for federal systems globally. This approach enables efficient resource allocation and politically feasible implementation strategies for aligning national climate commitments through a decentralised, bottom-up approach.

Reconciling Productivity and Sustainability: The Role of Climate Information and Climate-Smart Agriculture Practices in Smallholder Wheat Farming

Ziqi Wang, Wanglin Ma

Lincoln University, Christchurch City, New Zealand

Keywords:

26. Practice Change and Adoption

27. Productivity and Efficiency

Paper Abstract:

Climate change and resource constraints have heightened the urgency of achieving sustainable agricultural growth, particularly in regions dominated by smallholder farmers. Enhancing ecological efficiency while maintaining crop yields has become a central concern for policymakers and researchers. This study explores how the acquisition of climate-related information and the adoption of climate-smart agricultural (CSA) practices jointly influence farm performance, with particular attention to the balance between ecological sustainability and productivity. Using recent household survey data from major wheat-producing regions of China, we apply a structural econometric framework that accounts for potential endogeneity between information acquisition, technology adoption, and production outcomes. The findings

suggest that access to information and adoption of CSA practices are closely linked, and their interaction significantly shapes ecological efficiency and yield outcomes. The evidence points to the need for integrated policy strategies that simultaneously strengthen rural information systems, lower the barriers to CSA adoption, and promote environmentally sound practices. In doing so, the study provides timely insights for governments, extension services, and development agencies seeking to reconcile productivity growth with ecological sustainability in smallholder farming systems.

Keywords: Climate information acquisition; Climate-smart agriculture practice; Ecological efficiency; Sustainable farming

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Mechanization Services, Farmers' Adverse Selection and Productivity: Evidence from Farm-level Wheat Production in North China

Yu Sheng[1], Hangyu Zhang[2], Jiping Ding[3]

[1]Australian National University, Canberra, Australia. [2]Fujian Agriculture and Forestry University, Fuzhou, China. [3]North West Agriculture and Forestry University, Xi'an, China

Keywords:

3. Agricultural Production

27. Productivity and Efficiency

Paper Abstract:

This paper investigates the adoption and productivity effects of mechanization services across ploughing/sowing, plant protection, and harvesting stages in Chinese agriculture. Utilizing a balanced panel dataset of 145 wheat farms in North China from 2013 to 2020, featuring detailed stage-specific input and output data, we estimate a multistage production function and evaluate the role of mechanization services relative to self-owned capital through the structural econometric modeling estimate. Findings reveal significant under-utilization of mechanization services by 20-50% during plant protection, driven by adverse selection due to unobservable provider performance, constrains overall mechanization adoption and limits farm-level productivity growth. By quantifying stage-specific productivity impacts, we identify this critical market failure impeding mechanization adoption by up to 20% and its potential to enhance efficiency by 7%. These results provide actionable insights for developing countries with smallholder-dominated agriculture, informing policies to promote mechanization and sustain agricultural productivity.

Drivers and Impacts of Certified Potato Seed Adoption: Evidence from Farm Households in Bhutan

Erdal Karacan

Lincoln University, Christchurch, New Zealand

Keywords:

26. Practice Change and Adoption

27. Productivity and Efficiency

Paper Abstract:

Potatoes are a vital cash crop in Bhutan, contributing significantly to rural livelihoods, household income, and national food security. However, productivity remains constrained by limited access to quality seed, inefficient input use, and market challenges. Certified potato seed adoption has emerged as a key pathway to raising yields, improving resource efficiency, and enhancing household welfare. Using survey data from 590 potato-farming households, this study applies an inverse probability weighted regression adjustment (IPWRA) model to rigorously assess the determinants and impacts of certified seed adoption. The results show male-headed households are 8.5% more likely to adopt certified seeds, and households with mobile phones are 11% more likely. Proximity to markets and seed suppliers increases adoption, with greater distances reducing adoption probability. Mixed-slope land (20.9% higher probability) and selling via middlemen (23.2% higher probability) also drive adoption. We also find that certified seed adoption raises potato yields by 14.7% (727 kg/acre) and per capita household income by 34.1% compared to non-adopters. Adopters reduce fertilizer expenditure by 67.9% and pesticide expenditure by 93% per acre, enhancing resource efficiency and sustainability. These findings highlight that certified potato seed adoption should be promoted through improved seed distribution systems, digital extension services, and targeted support for women farmers. Such measures can boost productivity and incomes while reducing input use, aligning with Bhutan's green development and food security goals.

Parallel Session: Agricultural Labour & Wellbeing

08:30 - 09:50 Thursday, 12th February, 2026

P Riverbank R8

Chair: Thanh Tran Nguyen

Are Women in Agrarian Contexts Unequally Impacted by Extreme Temperatures?

Deepti Sharma[1], Vidya Vemireddy[2]

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Keywords:

8. Climate Change

10. Development Economics

15. Farm Management and Farmer Behaviour

17. Food, Health and Nutrition

25. Policy Analysis

Paper Abstract:

This paper investigates how climate change reshapes women's time allocation between paid and unpaid work in rural India. Using nationally representative Time Use Survey data merged with historical district-level temperature records, we examine whether women reduce their labor supply in agriculture while intensifying domestic and care responsibilities under extreme heat. We find that high temperatures significantly reduce women's time in paid agricultural work by up to 96 minutes per day, while increasing unpaid domestic work by about 75 minutes daily — highlighting women's role as intra-household "shock absorbers." These effects are especially pronounced among women of reproductive age, lower caste groups, marginal landowners, and married women. By uncovering the hidden time trade-offs that climate shocks impose on women, this study broadens our understanding of climate-labor dynamics, demonstrating how rising temperatures exacerbate gender inequalities through unpaid labor burdens. The findings underscore the need for climate and labor policies that recognize and redistribute women's unpaid work.

Outsourced Machinery Services and Farmers' Well-Being: Evidence from Rice Smallholders in China

Huanyu Zhu, Wanglin Ma

Lincoln University, Christchurch, New Zealand

Keywords:

3. Agricultural Production

4. Agricultural Technology and Innovation

Paper Abstract:

With the growth of urban and rural economies, agricultural labour is increasingly shifting to non-agricultural sectors—a trend especially evident in developing and transition economies. While this shift raises household income, it also reduces farm labour supply and raises production costs, threatening agricultural sustainability. Mechanization has thus become essential for improving efficiency and substituting labour. This study employs survey data from 1,577 rice farming households across Hubei, Jiangsu, and Yunnan provinces, utilizing a Two-Stage Residuals Inclusion (2SRI) model to examine how outsourced machinery services influence positive well-being (life satisfaction, happiness) and negative outcomes (loneliness, depression). Findings reveal that outsourcing behavior is influenced by household size, asset endowment, farmland area, terrain conditions, and cooperative membership. Although outsourcing does not significantly alter life satisfaction or happiness, it markedly exacerbates loneliness and irritability among elderly farmers and those in Yunnan. Marital status, asset ownership, and cooperative membership mitigate these negative effects. While outsourced machinery services enhance productivity and food security, they may compromise mental health in socially vulnerable regions. Policy implications include strengthening service networks, supporting cooperatives, and improving social support systems to balance efficiency gains with overall farmer well-being.

Does Off-farm Work Participation Incite Climate-smart Agricultural Practice Adoption: Evidence from Indian Potato Farmers

Junpeng Li[1], Zhao Li[2], Wanglin Ma[2]

[1]Huaiyin Normal University, Huai'an, China. [2]Lincoln University, Christchurch, New Zealand

Keywords:

4. Agricultural Technology and Innovation

8. Climate Change

Paper Abstract:

In an era of climate change, penetrating climate-smart agricultural (CSA) practices constitutes a critical pillar of enhancing agricultural production's resilience to increasingly severe natural shocks and securing food supply. Off-farm work participation smooths farmers' budgets and improves their human capital, which can potentially ease the adoption of CSA practices. Therefore, the present study attempts to unlock a practical strategy to promote CSA practice adoption with a special emphasis on the role of off-farm work participation. To this end, samples regarding potato farmers in India are collected and analyzed in the present study. We use a categorical variable that considers four typical practices (i.e., planting date adjustment, organic fertilizer application, improved potato varieties, and crop rotation) to measure potato

farmers' CSA practice adoption status. Empirical results derived from the conditional mixed process model suggest that participating in off-farm work triggers farmers to adopt more CSA practices in their potato cultivation. Disaggregated analysis indicates that off-farm work participants cultivating small and medium farmland and experiencing diseases tend to adopt more CSA practices compared with their counterparts. Moreover, empirical analysis regarding specific CSA practices suggests that off-farm work participation significantly promotes the adoption of organic fertilizer application, organic fertilizer application, and crop rotation. As it stands, our study verifies the complementary relationship between off-farm work participation and CSA practice adoption. Accordingly, our study suggests that policymakers and stakeholders seeking to enhance the adaptive capacity of agricultural production to climate change should promote participation in off-farm employment.

Labour Choices, Livelihood Diversity, and Circular Agriculture in Rural Households: An Endogenous Switching Regression Analysis from Vietnam

Nguyen Thanh Tran, Koji Kawabata

Kobe University, Kobe, Japan

Keywords:

4. Agricultural Technology and Innovation

10. Development Economics

19. Impact Assessment

Paper Abstract:

Circular agriculture has become a strategy to achieve sustainable growth in the agriculture sector. Despite its documented environmental benefits, it remains unclear how circular agriculture contributes to shaping the labour choices and livelihood diversity of rural households. Drawing on panel data from the Thailand-Vietnam Socio-Economic Panel with 2909 observations, we employ an endogenous switching regression model to estimate the effects of circular agriculture on these matters. Results show that circular agriculture adoption significantly increases the use of family labour, while reducing hired labour expenditures. Additionally, adoption is associated with an increase in the Simpson's Diversification Index, suggesting a broader livelihood portfolio among adopters. Further analysis reveals that households implementing multiple circular practices experience more potent effects on both labour allocation and diversification. We also document heterogeneity by household labour endowment. And labour-rich households exhibit substantial substitution away from hired labour. These findings are consistent with theoretical expectations of sustainable intensification, in which labour-using innovations promote both productivity and resilience. Our results highlight the importance of policy support for circular agriculture, including labour training, technology subsidies, and extension services tailored to household labour availability. More broadly, the study contributes to the understanding of how environmentally sustainable farming practices reshape rural livelihoods in developing countries.

Parallel Session: Climate Change & Energy

08:30 - 09:50 Thursday, 12th February, 2026

P Riverbank R8B

Chair: Wanglin Ma

Decarbonizing Malaysia: The Strategic Role of Hydropower in Energy Transition and Environmental Sustainability

Azlina Abd Aziz, Muhamad Rias K.V. Zainuddin, Hasnisah Azilah

UNIVERSITI MALAYSIA TERENGGANU, TERENGGANU, Malaysia

Keywords:

8. Climate Change

13. Energy and Utilities

Paper Abstract:

The urgency of climate change and Malaysia's commitment to achieving a low-carbon economy have intensified the need to understand the drivers of CO_2 emissions and the potential of renewable energy to mitigate environmental degradation. Hydropower, the country's dominant renewable source, plays a central role in Malaysia's energy transition strategy. This study examines the relationship between economic growth, hydropower consumption, trade openness, population growth, and CO_2 emissions from 1970 to 2023 within the Environmental Kuznets Curve (EKC) framework. Employing the autoregressive distributed lag (ARDL) bounds testing approach, the findings show strong evidence of long-run cointegration and reveal an N-shaped EKC, where emissions rise with income, decline at intermediate levels, and increase again at higher income stages. Results show that renewable energy, particularly hydropower, significantly reduces emissions in both the short and long run, while other renewables remain statistically insignificant, likely due to limited adoption. Population growth intensifies emissions, whereas trade openness has no significant long-term effect. The negative and highly significant error correction term confirms rapid adjustment toward equilibrium. These findings emphasize the importance of diversifying Malaysia's renewable energy mix beyond hydropower and adopting integrated growth and population policies to ensure sustained emission reductions and climate resilience.

Technological Innovation, Environmental, Social, and Governance Factors, and Sustainable Energy Transition in Belt and Road Initiative Countries

Sidra Ishfaq, Wanglin Ma, Katie Bicknell

Lincoln University, Lincoln, New Zealand

Keywords:

8. Climate Change

13. Energy and Utilities

14. Environmental Economics

Paper Abstract:

Energy transition from non-renewable to renewable sources is central to the Sustainable Development Goals (SDGs), particularly climate action, affordable clean energy, and sustainable resource management. Rapid industrialisation and dependence on fossil fuels have intensified environmental degradation in the Belt and Road Initiative (BRI) region, creating challenges in balancing growth and sustainability. This underscores the crucial role of sustainable energy transition, driven by technological innovation and environmental, social, and governance (ESG) factors, in advancing clean energy platforms. This study explores the effects of technological innovation on ESG factors and sustainable energy transition (SET). At the first stage, principal component analysis is applied to synthesize the ESG and technology factors. The weighted TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method for EESGT (economic, environmental, social, governance, and technology) component is also developed as a ranking of BRI countries. At the second stage, advanced econometric techniques are employed, including the CSD test, slope homogeneity test, and second-generation unit root test (CIPS), which confirms the integration order of 0 and 1 for the considered variables, and the Westerlund cointegration test confirms the long-run relationship among the variables. After the preliminary tests, we employ a cross-sectional-autoregressive distributed lag (CS-ARDL) model to estimate both the short-term and the long-term analysis using balanced panel data (1995 to 2021) from 53 BRI countries. The results show that technological innovation, environmental, and governance factors positively and significantly affect SET in the long run. While the social indicator has no significant effect on SET. The results further reveal that the environmental, social, and governance factors positively and significantly affect SET in the short run. The economic growth measured by GDP per capita has a negative and significant effect both in the long and short run. Moreover, the ECM term is negative (-0.611) and significant, showing that the system converges towards the long-run equilibrium. Our findings show that technological innovation supports sustainable energy transitions in the BRI region by promoting efficient technologies, guiding green energy adoption, and helping balance economic growth with the SDGs.

Keywords: SET: Sustainable Energy Transition; SDGs; Principal Component Analysis; CS-ARDL; TOPSIS; EESGT; CSD; ECM

Analysing workforce requirements of renewable energy projects in regional Queensland.

Kalpana Pudasaini, John Rolfe

CQUniversity, Rockhampton, Australia

Keywords:

8. Climate Change

13. Energy and Utilities

Paper Abstract:

Abstract

The Queensland Government has a net zero target by 2050, with conversion to renewable energy sources underpinning this long-term goal. The previous state government projected that the transition would create approximately 100,000 direct and indirect new jobs by 2040 with high demand for electrical trades, engineering, construction workers and technicians. Most of the jobs growth are expected to be in regional Queensland in the solar and wind energy sectors. The projections seem overly optimistic, given that solar and wind infrastructure and components are mostly imported and low generation costs are in part because of small operational workforces.

Limited data on employment from renewable energy projects at the regional level makes it difficult to assess the net employment effects of the energy transition. This research aimed to assemble and analyse workforce requirement for renewable energy projects across Queensland. A desktop review identified all wind and solar farm projects in each region of the state and project status, whether operational, under construction, approved or planned. Construction and operational workforce data for the projects were collected from the available planning and approval documents, and other publicly available resources. The patterns and relationship between generation capacity and workforce needs were examined using descriptive statistics and regression analysis.

The results show that wind farms consistently have higher average generation capacities than solar farms across all regions and project stages, particularly those in the development phase. While workforce requirements vary across regions, technologies and project status, there is no consistent regional variation in workforce intensity. Regression analysis confirms a positive relationship between project size and job creation in both solar and wind projects, indicating that larger projects generate more employment in both construction and operational stages. However, regional location and project status was not significantly related to workforce numbers, suggesting that workforce estimates can be easily extrapolated across the State, irrespective of location or status.

Reducing Climate Vulnerability through Clean Cooking Fuels: Micro-Level Evidence from Ghana

Yazeed Abdul Mumin[1], Wanglin Ma[2], Mohammed Abdulai[1]

[1]University for Development Studies, Tamale, Ghana. [2]Lincoln University, Christchurch, New Zealand

Keywords:

8. Climate Change

13. Energy and Utilities

Paper Abstract:

Access to clean and sustainable energy is critical for reducing carbon-intensive growth and enhancing climate resilience, particularly in Sub-Saharan Africa (SSA), where reliance on polluting cooking fuels remains high. This study investigates the impact of clean cooking fuel usage on household climate vulnerability in Ghana, focusing on the mediating roles of health shocks, price indices, and health insurance. Estimating five meteorological stations in the Northern region of Ghana and the Ghana Living Standard Survey dataset, we find that using clean cooking fuels significantly reduces household climate vulnerability. This reduction is primarily driven by decreased exposure to climate variability, while no significant effect is observed on household sensitivity or adaptive capacity. Households using clean cooking fuels experience lower risks from climate-related events, supporting the argument that clean energy access and use enhance climate resilience. Furthermore, illness incidence, health insurance coverage, and policy perception are key mediators of the relationship between clean cooking fuel use and climate vulnerability compared to price indices. Our findings underscore the importance of promoting clean cooking fuels to enhance climate adaptation and public health while reducing greenhouse gas emissions. The results support policies facilitating clean energy transitions through subsidies, improved energy infrastructure, and targeted interventions to enhance climate resilience in vulnerable communities.

Keynote 2: Dr. Ken Henry - Environmental reforms to secure intergenerational justice. Sponsored by Adelaide University

10:00 - 11:00 Thursday, 12th February, 2026

P Riverbank R2-R4

Parallel Session: Development & Policy: Sponsored by ACIAR

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R2

Chair: Alexandra Peralta

Income Gap by Migration Status in Vietnam during the COVID-19 Pandemic

Nguyen Thi Pham[1,2], Yoko SAITO[2]

[1]Can Tho University, Can Tho, Vietnam. [2]Hokkaido University, Sapporo, Japan

Keywords:

10. Development Economics

19. Impact Assessment

Paper Abstract:

The COVID-19 pandemic disrupted labor markets globally, intensifying inequalities and reshaping employment structures. In Vietnam, internal migrants who relocate for higher wages and opportunities were disproportionately affected, whereas non-migrants faced distinct challenges. Using data from the Vietnam Household Living Standards Survey 2018–2022, this study applies propensity score matching, followed by subgroup analyses of the matched sample across socio-demographic characteristics to examine differential income effects. Findings indicate that migrants consistently earned more than non-migrants, with the income gap widening from 2018 to 2020 before narrowing during the early recovery period in 2022. Short-term income gains were observed among female migrants, rural residents, and non-contracted workers, largely because of labor shortages in essential industries offering higher-paying but riskier informal jobs. Educational attainment was decisive, with higher education reinforcing migrants' income advantages, and less-educated non-migrants benefitting only temporarily, reflecting substitution and displacement effects. To mitigate potential future labor supply shocks and prevent operational disruptions, labor demand shifted toward skilled and digitally literate workers, with firms favoring non-migrant employees with higher education amid automation and technological adoption. These findings underscore the urgency of policies that promote lifelong learning, social insurance, and employment protections, alongside investments in education, vocational training, and digital access, enabling workers, particularly those with lower education or without formal contracts, to adapt to a transforming labor market and foster an inclusive, resilient post-pandemic recovery.

Contextual Determinants of Agricultural Labor Productivity Amid Rural Transformation: Assessing the Impact of Institutional Arrangements, Policy Interventions, and Public Investments

Moyu Chen[1], Yu Sheng[2], Jane Golley[2]

[1]Peking University, Beijing, China. [2]Australian National University, Canberra, Australia

Keywords:

10. Development Economics

25. Policy Analysis

Paper Abstract:

Rural Transformation (RT) is a critical pathway for Low- and Middle-Income Countries (LMICs) to achieve the Sustainable Development Goals (SDGs) through agricultural development (AD) and structural transformation (ST), yet progress is highly uneven, marked by persistent gaps in Agricultural Labor Productivity (ALP). This paper investigates the roles of Institutions, Policies, and Investments (IPIs) in shaping agricultural labor productivity (ALP) at different stages of RT.

Methodologically, we employ a Conditional Quantile Regression (CQR) model combined with a semi-parametric approach, utilizing a comprehensive panel dataset covering 172 developing countries across 52 years (1970–2021). Our analysis focuses on: (1) the general impact of IPIs on ALP across the AD and ST stages, and (2) heterogeneity across regions and agricultural systems.

Three key findings emerge: First, historical institutions dominate during early RT stages, while public investments gain importance as transformation progresses. Second, a regional analysis shows that historical institutions remain highly influential in Africa, whereas public investments, especially irrigation infrastructure, drive ALP growth in Asia and Latin America. Third, across production systems, pastoral systems face compounded challenges of inefficient public investment and severe market distortions—particularly in livestock sectors.

We contribute to the literature by: (1) Conceptually framing RT as a dynamic process along two dimensions (AD and ST), each comprising five distinct stages that allow for a more nuanced analysis of transformation dynamics. (2) Employing the CQR model and semi-parametric approaches to estimate the heterogeneous and stage-specific non-linear effects of diverse policy instruments, providing a context-sensitive assessment of their effectiveness. (3) Providing actionable, stage-specific policy implications for LMICs, emphasizing that effective policy prioritization must align with a country's current stage of RT.

Analysing Gender Income Disparities in Australian Agriculture

Mahsa Rahmani Dizgah[1], Ying Xu[2], Sarah Wheeler[2], Duygu Yengin[1]

[1]Adelaide University, Adelaide, Australia. [2]Flinders University, Adelaide, Australia

Keywords:

10. Development Economics

12. Econometric Modelling

25. Policy Analysis

Paper Abstract:

This study examines gender disparities in income among Australian farmers using panel data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey for 2001–2023 Correlated random effects (CRE) regression models, validated by Hausman and Mundlak specification tests, are applied to identify the role of gender on farmers' income. Results indicate that female farmers earn substantially less than their male counterparts in the same occupational group, even after controlling for paid and unpaid work hours, education, age, region of residence, marital status, health, state of residence, and drought index. Farmers also earn less than non-farmers, highlighting structural disadvantages in the sector. Additional analysis shows that unpaid domestic and childcare significantly deepens the earnings gap, with women bearing a disproportionate share of these responsibilities. The presence of young children intensifies the penalty for women. Robustness checks using relative income measures confirm these patterns, although results for smaller subsamples are weaker. The findings underscore that gendered patterns of labor division persist in Australian farming and are reinforced by both economic and social structures. This study contributes to the literature on gender and agricultural economics by providing updated longitudinal evidence from Australia and highlights the need for targeted policies to reduce structural barriers, promote equitable access to resources, and support the redistribution of unpaid work.

Institutions Matter: Why Improved Seed Adoption Faltered After Seeds of Life in Timor-Leste

Alexandra Peralta[1], Rio Lawas Maligalig[1], Matias Tavares[2], Paulo Correa[2]

[1]Adelaide University, Adelaide, Australia. [2]National University of Timor Leste, Dili, Timor-Leste

Keywords:

10. Development Economics

19. Impact Assessment

Paper Abstract:

Adoption of improved seed varieties can increase crop yields, income, and food security for farming households in developing countries. Governments, international organizations, and NGOs have implemented programs to deliver improved seeds and promote uptake, with many studies documenting short-term success in adoption, yields, and welfare. However, most evaluations focus on immediate impacts during implementation, with limited evidence on longer-term outcomes once fundings ends. Moreover, less attention has been paid to the institutions that underpin access to high-quality seed, particularly formal seed systems.

This paper addresses this gap by evaluating the long-term impacts of Seeds of Life (SoL), a program implemented in Timor-Leste between 2000 and 2016. SoL aimed to expand food crop production and strengthen national food security by increasing farmers' access to improved seed varieties suited to local conditions. The program also established an institutional framework within the Ministry of Agriculture and Fisheries (MAF) for a national seed system, including varietal research, certification, production and distribution. Funding was provided by

the Australian Government and MAF. Importantly, our evaluation occurred eight years after project completion.

We employed a mixed-methods approach. Ten Process Net Mapping (PNM) workshops, 11 key informant interviews (KIIs), and seven Focus Group Discussions (FGDs) were conducted with 127 men and women from MAF, including researchers, extension staff, and farmers across eight municipalities. Short surveys were implemented in 13 municipalities and 41 villages, alongside household surveys of 570 households in 2016 (project end) and 2023 (eight years later). PNMs mapped seed flows, funding, information exchange, and institutional hierarchies, while econometric analysis (fixed effects, pooled OLS, IVs) estimated adoption impacts. Together, these methods revealed how the seed system currently operates, identified bottlenecks in varietal development, certification, and delivery, and assess whether improved seeds translated into sustained adoption, production gains, and food security.

Findings suggest that Timor-Leste's national seed system remains functional but highly complex and ineffective. The PNM workshops revealed 46 stakeholders with 15–49 interlinkages. The system faces persistent challenges: regulatory gaps, weak monitoring, insufficient funding, bureaucratic delays, logistical and infrastructure constraints, limited human resources, and reliance on subsidies. Seed producers face payment delays, inadequate supply of certified seed, inability to sell surplus, dissatisfaction with low prices, and limited reinvestment capacity. Inconsistent purchasing and climate risks further undermine incentives.

Seed distribution continues, with 11 of 13 municipalities and 26 of 41 villages reporting seed receipt in 2023/24, almost entirely from MAF. Despite 83% of households being aware of improved varieties, adoption fell from 42% in 2016 to 34% in 2024, with no evidence of production or food security gains. Reuse of grain and cuttings eroded varietal traits, preventing sustained benefits.

This research contributes to the literature by examining outcomes after project funding ceases. It highlights that focusing narrowly on household-level impacts, while ignoring the institutional context, disregards critical factors influencing the longevity of development interventions. SoL left a legacy of a seed system embedded in MAF. However, without stronger institutions, endorsement of the National Seed Policy, adequate funding, and market development, the system remains unsustainable and politically dependent.

Parallel Session: Fisheries & Marine Systems

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R3

Chair: Iain Fraser

The Value of Information: integrating eDNA into a strategic, nationwide marine park monitoring program

Michael Burton[1], Johanna Zimmerhackel[1], Eric Raes[2], Alex Tomlinson[3]

[1]University of Western Australia, Perth, Australia. [2]Mineroo, Perth, Australia. [3]dcceew, Canberra, Australia

Keywords:

14. Environmental Economics

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

Value of Information (VoI) analysis quantifies how improved data can inform better decisions and optimise resource use. This study develops a conceptual framework for applying VoI to marine monitoring decisions, using a hypothetical case study to demonstrate the value of eDNA monitoring—both for a single decision and over time. We evaluate six monitoring scenarios:

- Business-as-usual (BAU): One annual field trip using traditional survey methods.
- eDNA-basic: Same as BAU, with additional eDNA sampling during the trips.
- eDNA+: Builds on eDNA-basic by adding monthly eDNA sampling using ships of opportunity.
- Each strategy is tested with both 7-day and 14-day field trips.

The case study is set in a hypothetical 10,000 km² Marine Park with complex habitats. Ecosystem condition is measured using a holistic health index (0 = degraded, 10 = pristine), based on a 'tree of life' concept with target, cautionary, and unsustainable zones.

Information on the contribution eDNA could make to monitoring was derived from a consultation with 20 expert researchers from six countries to estimate how confidently each monitoring scenario can measure ecosystem health.

Monitoring only generates a positive VoI if it leads to better decisions about restoration. All scenarios are compared to a baseline of no monitoring (i.e. full uncertainty), to determine which yields the highest net VoI—defined as net benefits of restoration minus monitoring costs—and the best return on investment.

The eDNA-basic and eDNA+ scenarios consistently outperform BAU in VoI, highlighting that adding eDNA and increasing sampling frequency can enhance decisions under uncertainty. In particular, eDNA+ (with ships of opportunity) delivers benefits up to 15–27 times greater than its costs.

We also simulated monitoring and management decisions over a 50-year period, starting from a degraded state (health index = 0), and explored the effect of different management costs. Perfect information (total certainty) is used as a benchmark to evaluate alternative scenarios.

The added value of eDNA emerges in two key situations:

- eDNA helps identify when to stop restoration, avoiding excessive costs. eDNA+ saved up to AUD 17 million (7%) in management costs vs. BAU.
- eDNA better identifies when restoration is worthwhile when benefits outweigh costs only slightly, yielding higher environmental benefits. In this situation, eDNA+ produced up to AUD 77 million more in net present value than BAU—about 25% of total management costs.

This analysis highlights the broader utility of VoI in marine park management. With further development, VoI outputs could support decision-support tools to help managers assess the viability and return on investment of monitoring strategies across various habitats, uses, and objectives. These tools can account for environmental variability, budget limits, and management success rates. Realizing this potential will require expanded datasets on monitoring accuracy and broader inclusion of economic valuations, including non-market values. While environmental decisions aren't always driven purely by economics, our findings emphasize the strategic advantage of integrating eDNA into national monitoring efforts to support evidence-based policy and adaptive management.

"*This project was co-funded by the Australian Government and the Minderoo Foundation under the Ocean Discovery and Restoration Program*"

Benefit-cost analysis of artificial reefs as a nature-based coastal protection at C.Y. O`Connor beach, Western Australia - WA Branch Prizewinner

Yunita W.N. Wakhida

University of Western Australia, Perth, Australia

Keywords:

16. Fisheries, Marine Systems and Aquaculture

23. Market Design and Policy

Paper Abstract:

Sea level rise is causing increased erosion in many regions, including Western Australia. Artificial reefs are a nature-based solution that offer coastal protection and ecological benefits. However, empirical evidence supporting the economic effectiveness of artificial reefs is limited.

Through a Benefit-Cost Analysis, this study evaluates whether the artificial reef at C.Y. O'Connor Beach, Western Australia, is sustainable for long-term coastal hazard management. The study compared three intervention scales (135, 270, and 540 modules) over a 50-year assessment period. The results indicate that the project is economically feasible and provides significant net benefits. Furthermore, diminishing marginal returns were observed, with additional modules resulting in smaller increases in benefits. The sensitivity analysis reveals that the project becomes unfeasible when only half of all benefits are realized, benefits are calculated at the lower bound, and the discount rate is high for the 540-module configuration. Overall, artificial reefs have strong potential as an adaptive nature-based approach to coastal management. However, the results should be interpreted carefully, as the estimated benefits depend on assumptions about wave energy attenuation and the validity of the benefit transfer.

The Economic Value of Locally Co-Produced Food: Fish Fingers as a Case Study

Iain Fraser

University of Kent, Canterbury, United Kingdom. University of South Australia, Adelaide, Australia

Keywords:

9. Consumer Choice

16. Fisheries, Marine Systems and Aquaculture

Paper Abstract:

We report results from an online discrete choice experiment assessing how UK consumers value foods made from commercial fishing by-catch that are locally designed, sourced, and produced. There is ample evidence that consumers often have greater trust and favour goods that are produced and sourced locally. This research considers the potential of locally co-created products that valorise under-utilised species and by-catch, support coastal economies, and align with sustainability goals. We examine whether valuations vary with geographic proximity to the product's origin, household income, and the presence of children. All three local attributes: local sourcing, local production, and community-led design, are positively valued as is the attribute of being "under-utilised" but a sustainably caught attribute is the most influential. Willingness to pay (WTP) increases with income for all attributes. However, even the lowest-income groups exhibit substantial WTP. The distance between consumers and the product's locality does not significantly affect WTP.

Parallel Session: Environmental Values

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R4

Chair: Darla MacDonald

Beyond Single Choices: Understanding Farmer Adoption of Small-Scale Tree Plantings through a Multiple Discrete–Continuous Choice Experiment

Maksym Polyakov[1,2], Michael Burton[2], Scott Graham[3], Alexander Herzig[4], Nick Kirk[3], Sam McNally[3], Dan Richards[3], David Whitehead[3]

[1]Bioeconomy Science Institute, Auckland, New Zealand. [2]The University of Western Australia, Perth, Australia. [3]Bioeconomy Science Institute, Lincoln, New Zealand. [4]Bioeconomy Science Institute, Palmerston North, New Zealand

Keywords:

14. Environmental Economics

29. Valuation

Paper Abstract:

Planting small groups of trees within grazed landscapes can provide climate, biodiversity, and farm system benefits without converting land to plantation forestry. Such “tactical” plantings can enhance carbon stocks, diversify farm systems, provide shelter for livestock, and build resilience to climate extremes, while maintaining productive grazing. Yet adoption depends on how well programmes align with farmers’ preferences and constraints.

We conducted a discrete-continuous choice experiment (CE) with New Zealand livestock and lifestyle landholders to measure both the likelihood of adoption and the land area they would allocate to different planting configurations and tree species. Unlike traditional designs, our experiment enabled respondents to choose none, one, or multiple planting types and to specify the hectares dedicated to each, capturing both the extensive margin (whether to plant) and the intensive margin (how much to plant). The data were analysed using a multiple discrete–continuous extreme value (MDCEV) model.

Results show strong heterogeneity in preferences. Farmers consistently preferred native species and, to a lesser extent, exotic broadleaves, while exotic conifers were less attractive. Among configurations, clusters and scattered plantings were more acceptable than larger blocks or linear strips. Farm size negatively affected adoption, but existing plantings of the same type had a positive influence, suggesting learning or path dependence. Programme support also mattered: eligibility for carbon credits significantly increased adoption, while grant payment and seedling provision had smaller but positive effects.

These findings provide new evidence for designing policy instruments that encourage strategic tree planting in pastoral landscapes. By aligning incentives with farmer preferences, such programmes can contribute to New Zealand's 2050 net-zero goals while delivering co-benefits for resilience, biodiversity, and rural communities.

A novel economic approach to urban forest expansion: Investigating the feasibility of a rates-based policy to fund and incentivise urban canopy cover on private land in Australia

Emma Scaife, Ram Pandit, Alex Gardner

The University of Western Australia, Perth, Australia

Keywords:

14. Environmental Economics

25. Policy Analysis

Paper Abstract:

How can local governments meet urban canopy targets when there is not enough public land to do so? Private land is the key, but existing tree protection policies create tension with private property rights, and in any event such policies are not targeted at increasing the urban forest on private land, merely at slowing its decline. This research study considers the feasibility of a novel economic policy that aims to use smart regulation principles to (a) fund the acquisition of private land for conversion to urban forest and (b) encourage an increase in canopy cover on private land. The study was conducted in Australia, where analysis of the regulatory framework and technological capability available to local governments indicates that such a policy suite is technically feasible, but the community response to this novel policy remains unknown. We conducted a survey of Australian ratepayers to understand how much they would be willing to pay to fund a canopy increase in their local area, and whether the provision of a rates rebate for private canopy would result in increased tree planting on private land. This presentation will discuss the findings and demonstrate how this study could be used to transform the available policy suite for local government and help drive an increase in urban canopy cover in Australia.

What do we know about the social and economic costs of urban environmental losses in Australia?

Md Sayed Iftekhar

Griffith University, Brisbane, Australia

Keywords:

14. Environmental Economics

29. Valuation

Paper Abstract:

Many cities around the world, including major capital cities in Australia, are losing their natural environments, such as green and blue spaces, due to the pressures of population growth and climate change. Consequently, cities are becoming denser, drier, hotter, greyer and communities are becoming more vulnerable. The loss of urban environments can have wide-ranging impacts on individuals and households, the productive sector, and the broader economy and environment. These effects often extend beyond city boundaries, creating geographic spill over and macroeconomic consequences. Despite rising environmental concerns, there remains limited understanding of the actual economic and social costs of urban environmental losses in Australia (Gunawardena et al. 2020, Iftekhar et al. 2022). Through a systematic review of existing literature and policy documents, I will summarise what is currently known about the social and economic costs of urban environmental decline in Australia highlighting the current knowledge gaps.

Willingness to Pay for Soil Stewardship in a Busy Labelling Environment

Darla MacDonald

University of Tasmania, Tasmania, Australia

Keywords:

9. Consumer Choice

29. Valuation

Paper Abstract:

Soil stewardship refers to the management of agricultural systems in ways that maintain and enhance soil health, fertility, and productivity while protecting broader ecosystem functions. These practices are central to sustainable food production, contributing to improved soil structure, biodiversity, water regulation, and resilience to climate variability. However, these practices yield a mix of long-term private and public benefits. Recognising that consumer demand can influence the adoption of sustainable farming practices, a Soil CRC funded project investigated how consumers perceive, and potentially value products produced under soil stewardship principles. Initially a design thinking workshop elicited some product certification approaches. To test consumer acceptance, a questionnaire with a series of choice tasks was developed with a focus on two consumer products: wheat biscuits and potatoes. In this presentation, we will look at one treatment (n=1100 respondents) and willingness to pay for certified labels which increased biodiversity, carbon sequestration, and soil nutrients. We present results of a series of latent class models which provide perspective on what consumers value in a busy labelling environment.

Parallel Session: Productivity & Decisions

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R5

Chair: Ross Kingwell

Exploring Total Factor Productivity and the Diversity of Milk KUDs in West Java: Strengthening Dairy Cooperatives and Advisory Systems

Sahara Sahara[1,2], Yanti Nuraeni Muflikh[1], David McGill[3], Jenny Hanks[3], Attin Syahnurottin[1], Syarifah Amaliah[1]

[1]IPB University, Bogor, Indonesia. [2]International Trade Analysis and Policy Studies (ITAPs), Bogor, Indonesia. [3]Central Queensland University, Rockhampton North, Australia

Keywords:

1. Agribusiness

27. Productivity and Efficiency

Paper Abstract:

The Indonesian Dairy Blueprint 2013–2025 set targets of meeting 60% of national milk demand domestically, achieving 20 liters/day cow productivity, increasing milk consumption to 30 liters per capita per year, and maintaining a dairy herd of 1.8 million. However, the sector faces challenges from Foot and Mouth Disease (FMD) and Lumpy Skin Disease (LSD), which threaten productivity and herd growth. This paper assesses the Indonesian dairy sector's Total Factor Productivity (TFP) and examines the attributes, roles, and contributions of Koperasi Unit Desa (KUD) or dairy cooperatives in West Java as a case study. It also identifies challenges faced by KUDs and the Agricultural Extension and Advisory System (AEAS) in supporting farmers' welfare and productivity, and explores opportunities for collaboration to strengthen the dairy value chain. The study combines secondary and primary data. National dairy output and input data from FAO and BPS were used to estimate TFP. Additionally, 102 documents on KUDs and 43 articles on AEAS were reviewed, supported by workshops involving 69 stakeholders from West Java's dairy system. Findings indicate modest but uneven productivity growth, with national TFP increasing by about 1.5% annually. While showing gradual improvement, this is insufficient to transform the sector or close productivity gaps. Stagnation persists in provinces constrained by weak institutions, slow technology adoption, and limited resources. In West Java, 23 active KUDs and seven independent farmer groups were identified, varying in scale and services. Their roles include milk collection and quality control, input provision, feed processing, animal health, training, and marketing. The diversity highlights uneven cooperative capacity and business models. West Java's AEAS network includes 39 stakeholders such as processors, feed suppliers, veterinarians, government agencies, NGOs, universities, media, and financial institutions. Their contributions range from short-term training for cooperative boards and members, farmer education programs, provision of livestock and equipment, financial support, and targeted

initiatives for women, such as the Kartini program. Workshops identified 18 constraints. The most critical was land shortage (18.4%), which limits forage supply and herd expansion. Regeneration issues (15.5%) underscore difficulties attracting young farmers, while herd losses from FMD (8.7%) further threaten growth. Business-model challenges (5.8%) highlight the need for stronger cooperative governance. Other issues include fragmented extension services and inconsistent quality standards. Twelve opportunities emerged, led by strong market potential (46.8%). Government programs (6.5%), particularly school milk, and land availability (5.2%) also provide pathways to expansion. Recommendations include integrated land-forage strategies, collaborative biosecurity systems, stronger cooperative governance, and innovative finance models linking capital to performance and quality standards. In conclusion, The Indonesian dairy sector shows modest TFP growth but faces persistent structural and institutional bottlenecks. Strengthening KUD capacity and leveraging pluralistic AEAS through coordinated action can unlock productivity gains, enhance resilience, and improve smallholder welfare.

The productivity slowdown — the agriculture story

Will Chancellor

ABARES, Canberra, Australia

Keywords:

27. Productivity and Efficiency

Paper Abstract:

Australian agriculture has benefited from a long period of sustained productivity growth over the last five decades. However, since 2000, this growth has slowed compared to the productivity gains achieved during the 1980s and 1990s—when structural adjustment and the adoption of labour-saving mechanisation was in full force. Nevertheless, agriculture is doing something right, leading well above market sector productivity growth in the ABS statistics. Yet, there is more to this story - once the data are aggregated into national level statistics the nuances are easily lost. Untangling the statistics reveals a multi-speed effect, highlighting that while productivity on some farms has thrived, on others it has lagged.-

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Understanding hidden losses in agri-food systems: A case study of a commercial broccoli farm in New Zealand

Ashmita Pandey, Peter Tozer, Janet Reid

Massey University, Palmerston North, New Zealand

Keywords:

3. Agricultural Production

27. Productivity and Efficiency

Paper Abstract:

Food loss and waste have been persistent problems throughout human history, posing significant economic, social, and environmental impacts. Advanced agricultural practices, technology, and infrastructure have helped reduce this issue to some extent. However, substantial quantities of food are still lost or wasted in the supply chain from production to consumption. Fresh fruits and vegetables experience the highest losses among various food groups due to their perishability, seasonality, and production challenges. The Food and Agriculture Organisation estimates that nearly 50% of all fruits and vegetables produced globally are wasted. These statistics exclude on-farm losses, mainly pre-harvest and harvest losses, which obscure the full extent of inefficiencies in the food system. Further, most existing on-farm food loss studies have relied on one-off loss assessments across single or multiple farms, without accounting for seasonal variation. In New Zealand, however, limited research has focused on quantifying food loss and waste at the primary production level, particularly within the vegetable sector. Therefore, our study aims to quantify the extent of losses and explore their determinants across multiple seasons through a case study approach on a commercial broccoli farm in New Zealand. This study adopted a longitudinal observational design on a single farm to identify consistent patterns and temporal variations in on-farm losses. We selected broccoli as a reference crop due to its high perishability, narrow harvest window, and status as a staple in the New Zealand diet. We evaluated losses using direct field measurements, which involved systematic random sampling with the counting method and visual inspections at different growth stages, and were supplemented by interviews with key informants. Pre-harvest loss in this study is classified into two categories: losses that occur before the plant reaches the harvestable stage, and losses that occur after the plant has reached the harvestable stage but becomes inedible by the time of harvest. Harvest loss encompasses the losses during harvest, including unharvested mature crops. The preliminary results from seven planting seasons show a significant amount of harvestable broccoli heads wasted in the field, ranging from 23% to 80%. Additionally, a notable percentage of broccoli plants were lost before reaching the maturity or harvestable stage, which varies across seasons, i.e. 8% to 45%. In one season, high losses were observed due to predator damage; however, in other seasons, these losses were relatively low and mainly attributed to mechanical errors during planting and inter-row operations. Significant wastage occurred on the farm due to unharvested broccoli heads of harvestable quality, primarily due to market or economic factors. These considerable on-farm losses represent a missed opportunity to improve food availability without requiring additional resources and also reflect the opportunity costs associated with resources and inputs invested in the food that fails to reach consumers.

Risky Business: An Educational Farming Simulation Game. Its nature and player assessments

Ross Kingwell

Department of Primary Industries and Regional Development, WA, Perth, Australia. University of Western Australia, Perth, Australia

Keywords:

4. Agricultural Technology and Innovation

25. Policy Analysis

27. Productivity and Efficiency

Paper Abstract:

Simulation games can play a useful role in agricultural education, especially as emerging generations of agriculturalists are more likely to have youthful experience in computer-based gaming. This paper describes one such computer-based simulation game, *Risky Business*, in which the gamer acts as the manager of a large mixed enterprise rainfed farm. As manager they are required to undertake many practical decisions across a sequence of production years in the face of weather-year and price volatility whilst simultaneously dealing with environmental challenges such as containing the spread of dryland salinity. The game can be played competitively by individuals or by teams of players. As the game's name suggests, a successful player is one best able to navigate the risks and opportunities inherent in managing the farm business. The game is flexibly structured so the game master (teacher), depending on their learning objectives, can highlight various aspects of farm management and the environment of farming. The game's structured learning architecture combines the gamer's state of knowledge with learnings created during the game via guided reflection, conceptual abstraction, and active experimentation. The platform's novel contribution lies in its synthesis of decision analysis, experiential pedagogy, entertainment-based competitive engagement, and systems thinking. This paper reviews players' assessments of their gaming experience over a 15 year period, revealing that the game consistently cements formal instruction about farm business management via an engaging, relevant gaming experience that delivers educational objectives.

Parallel Session: Agriculture & Development

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R6

Chair: Sophie Lountain

Transforming Rural Lives through Digital Platforms: Social Media and Well-Being in Sri Lanka - Heading West Award Winner

Bowen Shen, Wanglin Ma

Lincoln University, Christchurch, New Zealand

Presentation Type:

3. Contributed Paper

Keywords:

1. Agribusiness

10. Development Economics

Paper Abstract:

While digital technology increasingly penetrates rural communities in the Global South, there is a lack of empirical evidence on its psychological implications in these settings. This study investigates the impact of social media use on subjective well-being (SWB) among rural populations in Sri Lanka. Using cross-sectional data from a survey of 732 individuals residing in rural Sri Lanka, this paper applies the Inverse Probability Weighted Regression Adjustment method to estimate the average treatment effect on the treated, thereby addressing potential endogeneity and selection bias associated with voluntary social media use. SWB is measured through indicators that capture both positive and negative effects. The results indicate that social media use significantly enhances users' positive affects, such as happiness and life satisfaction, while reducing negative emotions, including loneliness and stress. These findings suggest that in rural areas, where traditional forms of social interaction may be constrained, social media platforms can enhance emotional well-being by facilitating connections, information exchange, and psychosocial support. Contrary to the prevailing discourse emphasizing the harmful effects of digital media on mental health, this study provides evidence that, in low-resource contexts, the benefits of social media engagement can outweigh the risks. The research contributes to the growing literature on digital inclusion, mental health, and development by offering context-specific insights from rural Sri Lanka. It also carries implications for policymakers and development practitioners aiming to leverage digital technologies to enhance rural quality of life.

Bridging Efficiency Gaps in Rice Production: A Primal System Analysis of Technical and Allocative Constraints in Bangladesh

Limon Deb[1,2], Di Zeng[1], Rida Akzar[1], Md. Abdus Salam[3]

[1]The University of Adelaide, Adelaide, Australia. [2]Bangladesh Rice Research Institute, Gazipur, Bangladesh. [3]Bangladesh Agricultural Research Council, Dhaka, Bangladesh

Keywords:

10. Development Economics

27. Productivity and Efficiency

Paper Abstract:

Agricultural production efficiency remains suboptimal across the world, with the most severe inefficiencies found in low- and middle-income countries. In these settings, limited resources, institutional weaknesses, and restricted access to modern technologies constrain productivity growth and slow the transition toward sustainable food systems. In Bangladesh, where rice cultivation is largely undertaken by smallholder farmers, improving input-use efficiency is particularly critical for ensuring national food security, strengthening farm profitability, and enhancing resilience to both climatic and resource pressures. The progressive depletion of natural resources, combined with declining productivity from input-intensive practices, highlights the urgent need to address both technical and allocative inefficiencies in rice production. This study employs a primal system approach applied to a nationally representative dataset of 3,715 farm households. It evaluates the extent of technical and allocative inefficiencies across two major rice-growing seasons and diverse agroecological zones. Beyond measuring efficiency gaps, the analysis quantifies how technical and allocative inefficiency contribute to increased production costs and identifies the socio-economic, institutional, and environmental factors driving these inefficiencies. In doing so, the study seeks to inform targeted policy interventions aimed at reducing inefficiencies and enhancing resilience within Bangladesh's rice sector. The results reveal widespread technical inefficiency in both seasons, accounting for an estimated loss of nearly one-quarter of national rice production per season, with marked variation across agroecological zones. Allocative inefficiency is also pronounced: seed, fertilizer, and labour are consistently overutilized, while machinery use remains insufficient, particularly during the *Aman* season. Together, these inefficiencies distort input demand and elevate production costs by nearly 50%. The findings indicate that technical inefficiency exerts the stronger influence on rising costs, although allocative inefficiency also contributes significantly, compounding the overall economic burden borne by farmers. The coexistence of both forms of inefficiency highlights that farmers face dual constraints: reliance on suboptimal production practices and input allocation decisions that deviate from cost-minimizing levels. Efficiency outcomes are shaped by a complex interplay of agroecological conditions, institutional arrangements, technological access, and household-level socio-economic characteristics. Technical inefficiency appears more sensitive to production environments and managerial capacity, while allocative inefficiency is influenced more strongly by market access, behavioural choices, and institutional dynamics. Notably, certain factors, such as farm size, exhibit divergent effects on technical and allocative efficiency, pointing to

trade-offs between maximizing productivity and optimizing resource use. Taken together, these findings underscore that improving efficiency in Bangladesh's rice sector requires an integrated and multi-dimensional strategy. Enhancing technical efficiency will depend on strengthening farmers' managerial skills, promoting climate- and resource-smart technologies, and encouraging agronomic practices adapted to local conditions. At the same time, reducing allocative inefficiency will necessitate reforms in input and output markets, improved access to mechanization, expansion of extension and advisory services, and removal of institutional barriers that limit farmers' decision-making capacity. Narrowing both efficiency gaps can significantly reduce production costs, enhance farm profitability, and contribute to the long-term sustainability and resilience of rice production in Bangladesh under growing climatic and resource pressures.

Gendered Pathways in Agri-Food System Transformation: Expectations and Realities of Women's Participation in Household Decision-Making among Farming Families in West Java, Indonesia

Sara Ratna Qanti[1], Dini Rochdiani[1], Nur Syamsiyah[1], Rio Maligalig[2]

[1]The Centre for Sustainable Food Systems, Faculty of Agriculture, Universitas Padjadjaran, West Java, Indonesia. [2]The Centre for Global Food and Resources, University of Adelaide, Adelaide, Australia

Keywords:

10. Development Economics

15. Farm Management and Farmer Behaviour

Paper Abstract:

Transformations in agri-food systems require not only technological and market innovations but also social and institutional changes that ensure inclusiveness and equity. Women's empowerment—particularly through active participation in intra-household decision-making—is a critical yet often overlooked driver of sustainable agricultural transformation. When women gain stronger bargaining power and a more influential voice in household and farming decisions, the benefits extend to family welfare, resource use, and long-term system resilience. This study explores the degree of women's participation across eight intra-household decision domains among farming families in West Java, Indonesia, and examines whether current participation levels align with the expectations of both women and men. Using qualitative data from Focus Group Discussions involving 100 male and female farmers at upper region of Citarum watershed—the biggest and the important watershed in West Java Indonesia—with thematic and discourse data analysis, our finding suggests that although men and women have different perceptions about the extent of women's participation in agricultural and non-agricultural decision-making, they are likely to agree that women have the most participation in investment and household consumption. They also tend to have similar views that women have the least participation in the decisions related to production, income generation, and training. Perceptions about the adequacy of women's participation also diverge by gender and domain:

female farmers often aspire to greater influence and joint decision-making, while male farmers tend to view current arrangements as balanced. These differences are shaped by household characteristics and whether they are located in the rural or more urbanised areas, indicating that empowerment outcomes are embedded within broader socio-economic and cultural contexts. The findings underscore that promoting gender equity within agricultural transformation demands context-specific approaches that reflect household characteristics and local socio-cultural realities. Empowerment initiatives should align with women's aspirations and the diverse dynamics of rural households to ensure inclusive, sustainable transitions within Indonesia's agri-food and environmental systems.

The Women's Empowerment and Labour (WEaL) Scale: Developing a Proxy Measure of Empowerment in South Asia

Sophie Lountain, Bethany Cooper, Lin Crase

University of South Australia, Adelaide, Australia

Keywords:

1. Agribusiness

10. Development Economics

Paper Abstract:

Over the past twenty years, methods for measuring women's empowerment have evolved, with tools such as the Women's Empowerment in Agriculture Index (WEAI) and its variants playing a part. However, their use remains limited due to the complexity of these tools and the high costs involved in implementing them. Measuring time-use agency provides a promising, cost-effective, and easy-to-implement way to serve as a proxy for empowerment. This work is based on the concept of time-use agency by assessing women's agency over labour as a proxy for overall empowerment. We introduce a contemporary Women's Empowerment and Labour (WEaL) scale, developed through exploratory factor analysis (EFA) and applied to primary data collected from rural India and Nepal in 2021. This is accompanied by confirmatory factor analysis (CFA) on a comparable dataset from 2024, along with a concurrent validation method that compares the WEaL results with those from the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI). The findings demonstrate a positive and significant link between the responses from both measurement approaches across the full sample, with strong correlations within specific groups. The outcome is a new, reliable 12-question measurement tool that can be easily adopted, especially in resource-limited research and policy settings.

Parallel Session: Groundwater: Sponsored by One Basin CRC

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R6B

Chair: Bethany Cooper

The economic value of surface and ground water resources: A simulation modelling case-study in the Condamine-Balonne catchment.

Brendan Power[1], Matt Hyde[2]

[1]Murray-Darling Basin Authority, Toowoomba, Australia. [2]Murray-Darling Basin Authority, Canberra, Australia

Keywords:

18. Grains and Cropping Systems

31. Water

Paper Abstract:

The economic viability of agriculture in most of Australia depends on the availability and cost of water. This paper quantifies the value to a case-study farm of harvested off-farm surface water and pumped ground water in a farming area with limited water trade: the Condamine-Balonne catchment of southern Queensland.

We used simulation modelling with a previously developed farm bio-economic model. The biological component is implemented using a farm level implementation of APSIM (the Agricultural Production System sIMulator), a daily timestep, process-based simulation model that captures the biophysical processes of farming systems. It captures the interactions between different crops, soils, management, climate, farm level resources such as water storages and off-farm water availability. The economic model is implemented by assigning a cost or income to a farm event (e.g., sowing, harvesting, or operation of farm pumps), providing farm gross margins.

Model parameters of farm resources (e.g., soil types, cropping areas, on-farm water storage capacities) and management in response to water availability, and economics such as variable costs and prices were developed through previous consultations with the case study farmer and updated to reflect recent prices and costs. Baseline results were validated with the farmer's experience but also compared against actual turnover data of similar farms. These anonymised data were obtained from business activity statements (BAS) made available through the Australian Bureau of Statistics Business Longitudinal Analysis Data Environment (BLADE).

Simulation experiments were conducted that varied the availability of surface and groundwater. The changes in farm water balance are dependent on multiple aspects of the production environments, such as available storage capacities, amounts and timing of rain, crop water

demand and cropping intensity. The interactions of these elements and the impacts on farm water balance and farm economics are presented.

Transforming Groundwater Governance in the Indus Basin: Barriers, Policy Principles, and Reform Pathways

Faizan ul Hasan

University of Canberra, Bruce, Australia

Keywords:

25. Policy Analysis

31. Water

Paper Abstract:

Groundwater is the hidden backbone of Pakistan's agri-food and energy systems, sustaining over 60 percent of irrigation in the Indus Basin and securing the livelihoods of millions. Yet this resource is under mounting stress from unsustainable extraction, climate variability, and fragmented institutions. Without reform, depletion threatens food security, biodiversity, and the resilience of farming communities, undermining broader sustainability transitions. This study examines how governance arrangements shape these outcomes and identifies reform pathways that connect water stewardship to the wider transition agenda of decarbonization, resilient supply chains, and equitable rural development.

The analysis draws on a review of national and provincial policies and laws, institutional mapping, and qualitative fieldwork with 52 stakeholders, including policymakers, researchers, and farmers across Punjab and Sindh. Three complementary lenses viz. Ostrom's Design Principles for common-pool resources, integrated water resources management, and stakeholder engagement theory, are applied to diagnose governance deficits. The evidence shows how overlapping mandates and unclear roles weaken monitoring and enforcement, outdated colonial laws entrench open-access conditions, policy incoherence across water, agriculture, energy, and climate undermines conjunctive use, and top-down processes marginalize farmers who collectively operate more than 1.4 million private tube wells. These mechanisms explain why principles such as adaptive or integrated governance remain aspirational, rarely moving beyond paper into practice.

From this diagnosis, six actionable policy principles are proposed: integrating resource planning across water, agriculture, energy, and climate domains; investing in technology within governance frameworks to enable transparent, real-time monitoring; empowering institutions through clarified mandates and capacity building; embracing innovation via managed aquifer recharge, citizen science, and public–private partnerships; enhancing cross-sector and inter-provincial collaboration; and engaging communities in co-designing and monitoring rules to foster compliance and legitimacy. Particular attention is given to the energy–water nexus: while solar-powered tube wells reduce energy costs and emissions, without licensing and monitoring

they incentivize over-pumping, illustrating how emerging technologies can backfire unless embedded within robust governance.

The contribution of this study is twofold. First, it develops an empirically grounded framework that links observed barriers to targeted levers, demonstrating how different theoretical lenses converge to explain implementation failure. Second, it positions groundwater governance as a linchpin of sustainability transitions in agri-food and environmental systems. The Indus Basin case shows that advancing food security, climate adaptation, and biodiversity protection depends on moving beyond policy intent to enforcement and inclusive participation. Lessons extend beyond Pakistan to other semi-arid regions where political economy constraints, legacy laws, and weak institutions perpetuate unsustainable groundwater use.

Reform will require legal modernization, inter-governmental coordination, investment in shared data systems, and building trust with farmers through transparent information and co-designed rules. By aligning theoretical insights with lived realities, this paper provides a roadmap for transforming groundwater governance from a barrier into an enabler of just, climate-resilient transitions.

The Impact of Extreme Drought on Crop Abandonment in the Ogallala Aquifer Region

Putri Komala Dara, Jordan Suter

Colorado State University, Fort Collins, USA

Keywords:

3. Agricultural Production

31. Water

Paper Abstract:

With the progression of climate change, extreme drought events are predicted to be more frequent and severe. Agriculture is a particularly vulnerable sector to the effects of drought due to its dependency on whether outcomes. Previous studies have shown evidence of the damaging effects of weather shocks on agricultural outcomes. Although they provide insight on the biophysical aspects of crop production, these studies are limited in capturing the behavioural response of producers in the wake of extreme weather events. Disregarding this important component would lead to biased estimates of the effects of extreme weather events on agricultural outcomes and economies. This paper evaluates the impacts of extreme drought on the incidence of crop abandonment in the Ogallala Aquifer region of the United States. Crop abandonment is defined in this research as the difference between acres harvested and acres planted in a given year. Expanding on previous studies that measure the sensitivities of agricultural outcomes to climate variation, this research evaluates crop-specific impacts of drought on abandonment and the extent to which groundwater access in the region moderates the impacts of drought. Results show that extreme drought increases the incidence of crop abandonment, with impacts most pronounced during the quarter corresponding to each crop's primary growth stage. Further, access to groundwater moderates the effects of drought,

although this ameliorating effect has decreased over time. These findings highlight how declining water resilience can amplify drought-induced production risks, providing insights that are increasingly relevant for managing agricultural systems and water resources under increasing climate uncertainty.

Understanding groundwater reallocation in South Australia: Valuing consumptive and non-consumptive uses

Bethany Cooper[1], John Kandulu[2], Lin Crase[1], Vandana Subroy[3], Michael Burton[4]

[1]Adelaide University, Adelaide, Australia. [2]Flinders University, Adelaide, Australia. [3]UniSA, Adelaide, Australia. [4]University of Western Australia, Perth, Australia

Keywords:

29. Valuation

31. Water

Paper Abstract:

Globally, climate change and increased water demand are expected to impact existing water sources. Water supply is also characterized by complex trade-offs due to competing demands across water sectors such as agriculture, urban and the environment. The reallocation of water is particularly challenging in the context of groundwater supply as the water source is difficult to monitor and control.

This study focuses on a case study from South Australia to better understand the range of values that accrue from water in agriculture and forestry and establish the value of water when it delivers ecological or environmental benefits. The Limestone Coast Landscape Region in South Australia is known for its diverse and productive agricultural sector that supports the local economy. It is also home to several regionally, nationally and internationally important wetlands.

Currently, groundwater is used to support a range of agricultural and forestry activities in the Limestone Coast region. There are also significant groundwater dependent ecosystems. There is limited understanding of some of the key values that would accrue from having additional freshwater available in the Limestone Coast region and its value in different uses. The estimated demand for additional future water supplies is also unclear, although the prospect of climate change would likely see increases in demand across multiple fronts. A better understanding of water demand and the value of water in different contexts will help managers prioritise investments and optimise the allocation of water in the region.

A discrete choice experiment was designed to understand what environmental changes would likely occur if different amounts of water were available to a specific site. The survey focussed on Bool Lagoon, a large and diverse freshwater lagoon system that is an important remnant wetland in the Limestone Coast region. An online survey was distributed to just over 1,100 respondents across South Australia covering both metropolitan and regional areas.

In the case of agriculture and forestry, primary and secondary data covering hardwood, softwood, dairying, winegrapes, onions and potatoes were collected and used to estimate the 'residual value of water' – that is, the dollars generated from having an additional megalitre (ML) of water available, minus other input costs.

We find that the ecological values are greater than those generated in most agricultural settings raising questions about the institutions for facilitating the reallocation of groundwater.

Parallel Session: Energy Decisions

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R8

Chair: Jeremy De Valck

The impact of energy storage systems on bidding behaviours of generators in the Australian Electricity Market

Songze Qu, Tiho Ancev

The University of Sydney, Sydney, Australia

Keywords:

13. Energy and Utilities

14. Environmental Economics

Paper Abstract:

We investigate the impact of energy storage systems (ESS) on the bidding behaviour of generators in Australia's National Electricity Market (NEM). By examining three ESS operational configurations—physically integrated batteries, virtually integrated batteries and pumped hydro systems—we explore their roles in wholesale markets. Using 5-minute price settlement interval data from 2018 to 2024, we employ a two-stage least squares approach. Our findings reveal interactions between storage integration models and market participants' responses. While virtually integrated ESS contribute to price moderation through competitive bidding pressure, physically integrated batteries sometimes encourage more aggressive bids, likely due to co-optimisation with renewable output and ancillary service obligations. These effects vary based on region-specific grid conditions and technology types, underscoring the importance of institutional design and ownership structures in shaping market outcomes. The results highlight critical implications for storage investment incentives, market architecture, and regulatory strategies in high-renewable penetration grids, offering valuable insights for policymakers and investors during energy transition to Net-Zero 2050.

Balancing economic, environmental, and social trade-offs in offshore wind development: Evidence from public preferences in Australia

Alaya Spencer-Cotton, Matt Navarro, Abbie Rogers, Michael Burton

The University of Western Australia, Perth, Australia

Keywords:

13. Energy and Utilities

14. Environmental Economics

Paper Abstract:

Harnessing offshore wind energy offers a significant opportunity to contribute to the global transition to renewable energy. However, public acceptance remains essential to its success. This study uses a discrete choice experiment to assess Australian preferences for offshore wind projects, focusing on trade-offs between visual impacts, local investment, environmental protections, and changes to household electricity bills. Mixed logit and latent class models reveal significant heterogeneity in public preferences. Most respondents prefer projects located further from shore, with greater local economic benefits, and stronger protections for marine mammals and birds. A distinct cost-sensitive class displays strong aversion to bill increases, suggesting that price impacts weigh heavily in public evaluations. Another segment shows high willingness-to-pay and lower cost sensitivity, particularly among higher income environmentally concerned individuals. These findings provide valuable insights for those aiming to design offshore wind projects that address diverse community preferences while delivering maximum economic, environmental, and social benefits.

Exploring the potential and drivers of PV-EV co-adoption in rural China

Jingwen Wu

South China Agricultural University, Guangzhou, China

Keywords:

13. Energy and Utilities

14. Environmental Economics

Paper Abstract:

Abstract: The promotion of renewable energy in rural areas not only contributes to China's dual carbon goals and rural revitalization but also aligns with the United Nations' Sustainable Development Goals (SDGs). For instance, household rooftop solar photovoltaics (PV) can help alleviate energy poverty and facilitate the transition toward cleaner energy use, consistent with the objectives of SDG 7. Likewise, the adoption of electric vehicles (EVs) in rural areas can mitigate transport poverty and enhance mobility accessibility, corresponding to the aims of SDG 11. Moreover, the co-adoption of PV and EV technologies enables households to use self-generated solar electricity for vehicle charging, thereby reducing both electricity and transportation expenditures while generating greater environmental benefits.Although extensive research has examined PV and EV adoption individually, the potential and determinants of their co-adoption remain underexplored in rural China. Drawing on a survey data across nine provinces, this study first categorizes household adoption of renewable energy technologies into four types: non-adopters, EV-only adopters, PV-only adopters, and PV–EV co-adopters. A random forest model is then employed to rank the importance of variables across different adoption groups, revealing a strong similarity in the demographic profiles of households adopting either PV or EV alone. Subsequently, a multinomial logit model is applied to identify the key drivers of co-adoption; household income, vehicle ownership, and available rooftop area all have significant positive impacts on co-adoption, whereas the age of the

household head has a significant negative influence.Overall, the study highlights the substantial potential for the co-adoption of PV and EV technologies in rural areas. Future policies should be designed in a integrated way to accelerate the diffusion of new energy technologies in rural communities and to improve residents' living standards.

Regional Variations in Energy Transition Preferences: A Discrete Choice Experiment in Central and Northern Queensland

Jeremy De Valck[1,2], John Rolfe[3,2]

[1]Central Queensland University, Brisbane, Australia. [2]Centre for Regional Economies and Supply Chains (CRESC), Rockhampton, Australia. [3]Central Queensland University, Rockhampton, Australia

Keywords:

13. Energy and Utilities

29. Valuation

Paper Abstract:

Queensland is operating a major energy transition, moving toward cleaner sources like solar and wind. This transition is not just about cutting emissions; it is about creating new job opportunities and planning carefully for the future. Regional Queensland plays a central role in this change, both as the home of many current energy and resource jobs and as a key location for new industries and infrastructure. To guide this process, the Queensland Government introduced the Clean Economy Jobs Act 2024, setting clear goals to reduce emissions over time and support new job creation, especially in regional areas. The government has committed $26 billion over four years (2024-28) to help make this transition work for everyone.

This research explores how Queensland's energy transition is affecting local communities, focussing on the Central and Northern Queensland regions. We investigate how people perceive the transition and how this might affect them, and what options could help them thrive. By listening to regional voices, this work aims to make sure that future decisions are fair, well-informed, and respectful of local community priorities.

Our experiment consists of a discrete choice experiment (DCE) conducted on 2,000 respondents recruited from the two regions. We explore preferences for the following attributes: energy type (solar, wind, mix), energy price volatility, visual impact, creation of new regional jobs, acceleration in renewable energy consumed in the region, and level of community support. To allow for the possibility of positive and negative preferences for the proposed hypothetical energy transition scenarios, we use split samples, allocating one group to DCE situations presented in terms of willingness to pay for the transition (assumed to be a net benefit to the local community) and the other to willingness to accept a compensation for the transition (assumed to be a net cost to the local community).

Our mixed logit and latent class analyses reveal diverging preferences across regions. Central Queensland respondents, who have stronger ties to the primary industries, are less supportive

of the transition, particularly because of employment and income security. By contrast, Northern Queensland respondents show greater enthusiasm, especially in scenarios where renewables are linked to new opportunities and infrastructure development. However, across both regions, respondents consistently prioritise creating regional jobs and community-level support mechanisms above factors such as visual impacts on the landscape.

The latent class model identifies three broad groups: one resistant to the transition, strongly concerned about job displacement and household costs; a second group that is optimistic and supportive of rapid renewable expansion; and a third "conditional" group whose support depends on how benefits and burdens are presented and distributed.

We conclude by presenting a few policy recommendations. A fair energy transition in Queensland will depend less on technology and investment alone, and more on ensuring that communities see secure jobs, stable energy prices, and tangible local benefits. Our study demonstrates that, at this stage, Queensland Government has not yet managed to convince a majority of regional Queenslanders, and that further community engagement around energy transition is needed.

JEL: Q42; Q48

Parallel Session: Forests & Vegetation

11:30 - 12:50 Thursday, 12th February, 2026

P Riverbank R8B

Chair: Arnaud Z. Dragicevic

A systematic review and meta-analysis of landowners' participation in forest carbon markets

Anna Nguyen, Sarah Wheeler, Alec Zuo, Thuy Pham

Flinders University, South Australia, Australia

Keywords:

7. Carbon and Nature Markets

14. Environmental Economics

Paper Abstract:

The forest carbon market operates in many countries around the world on the principle that forests act as carbon sinks, generating carbon credits through activities such as afforestation, reforestation, improved forest management, and avoided deforestation. This market has emerged as an alternative mechanism for resource mobilisation to mitigate climate change, while also contributing to local livelihood improvement and community empowerment in forest governance., Although adoption of the market is still in its infancy, several studies have identified various factors that both encourage and discourage forest landowners' participation in forest carbon markets. A systematic review and meta-regression analyses were undertaken to understand the factors influencing forest carbon market participation by forest market owners. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, multiple databases were searched from 2005 to 2025, with an initial pool of 1,769 papers identified for data extraction. 48 eligible qualitative and quantitative papers were shortlisted for further analysis. The synthesized factors were categorized into groups such as carbon program characteristics, forest owner socio-demographics, farm characteristics, psychosocial factors, and other relevant categories. Furthermore, a meta-regression using Comprehensive Meta-Analysis software was performed on 28 quantitative studies to further quantify the factors associated with landowner participation. The analysis explores how study-level characteristics (e.g., publication year, research region, sample size, and methodology) influence the effect sizes of market participation across studies.

Mangrove conservation and restoration is better than conversion for agriculture: a break even cost and cost-benefit analysis in Southeast Asia - NE Branch Prizewinner

Isabella Mandic

University of New England, Armidale, Australia

Keywords:

7. Carbon and Nature Markets

14. Environmental Economics

29. Valuation

Paper Abstract:

The dissertation evaluates the economic viability of mangrove conservation and restoration in Southeast Asia through a break-even carbon price analysis and cost-benefit analysis. Utilising a more methodologically rigorous approach to estimating restoration costs than previous studies and a more conservative approach to estimating benefits, this analysis considers a 30-year time horizon and incorporates both the social cost of carbon and carbon market prices in sensitivity analyses. The results demonstrate that while the estimated break-even carbon price is significantly higher than previously reported, mangrove conservation and restoration consistently yield positive net present values and benefit-cost ratios, even under conservative assumptions about ecosystem service benefits. In contrast, the business-as-usual scenario, involving mangrove conversion to agriculture and aquaculture, produced consistently negative net present values. The results reinforce the critical role of mangrove conservation and restoration for climate mitigation and economic strategies, even under uncertain conditions.

Does renewable electricity consumption mitigate environmental degradation in Sub-Saharan Africa? The role of political regime transition

NOBINKHOR KUNDU, Shamim Shakur, M. Humayun Kabir, Faruk Balli

Massey University, Palmerston North, New Zealand

Keywords:

11. Ecological Economics

13. Energy and Utilities

19. Impact Assessment

Paper Abstract:

This paper demonstrates that political regimes play a critical role in alleviating renewable electricity consumption and mitigating environmental degradation in Sub-Saharan African countries. Using the fixed effects model, this study examines the impact of political regime and renewable electricity consumption across 32 SSA countries, excluding Southern Africa, and accounts for robust tests. Findings reveal a significant and positive impact of the political regime on renewable electricity consumption across Sub-Saharan African countries, after controlling for demographic variables, economic variables, institutional factors, intrastate conflict, and access to energy. The results are also tested for the classification of political regimes, alternative independent variables, specifically various democracy indexes, while controlling for additional variables and including South Africa for robustness tests. Our findings strongly suggest a beneficial link between political regimes and renewable electricity

consumption, as significant Cragg-Donald's Wald F-tests reject the two-stage least squares (2SLS) instrumental variables. The results further demonstrate the association between renewable electricity consumption and political regime in different regions, as well as the impact of British and non-British colonization of Sub-Saharan Africa. Besides, political regime transition toward democracy over the period, with the mediating effect of CO2 emission, and the moderating effect of mineral rents, increased renewable electricity consumption in SSA. Further estimates of the environmental degradation model suggest that this result underscores the need to transition from an autocratic to a democratic regime, which can help mitigate environmental degradation by promoting renewable electricity consumption in Sub-Saharan Africa. By focusing on political regimes to enhance the interim goal of democracy, environmental degradation may improve by 14.0%, with approximately one-seventh of this gain attributed to increased renewable electricity consumption in Sub-Saharan Africa.

Forest Governance for Welfare and Resilience in a Changing Climate

Arnaud Dragicevic[1,2], Serge Garcia[3], Jean-Christophe Pereau[4]

[1]Chulalongkorn University, Bangkok, Thailand. [2]CIRANO, Montreal, Canada. [3]INRAE, Nancy, France. [4]University of Bordeaux, Bordeaux, France

Keywords:

8. Climate Change

21. Land and Natural Resource Management

Paper Abstract:

Climate change intensifies the challenge of sustaining forest landscapes that simultaneously deliver timber, carbon sequestration, recreation, and biodiversity conservation. We develop a stochastic network model of forest governance under climate-induced disturbances, combining nonstationary climate drivers, adaptive management, and evolutionary variational inequalities. The framework contrasts monofunctional zoning with multifunctionality, integrating spatial connectivity, adaptive budgets, and governance strategies. Using Monte Carlo climate scenarios for both high-emission (Business-as-Usual) and low-emission (Net Zero) policy pathways, we quantify welfare, resilience metrics -- including viability probabilities, welfare preservation ratios, conditional value-at-risk (CVaR), and downside risk -- and service synergies. Results show multifunctionality increases median discounted welfare by 14% (Business-as-Usual) and 15% (Net Zero) relative to monofunctional zoning and improves median resilience indicators by up to 30%, particularly under high climate variability, though it reduces peak timber output. We identify adaptive budget thresholds and service allocation mixes that jointly maximize welfare and robustness, revealing strong non-linear interactions between spatial connectivity and diversification. Policy analysis confirms multifunctionality consistently enhances welfare and resilience across climate scenarios, providing a quantitative basis for designing forest governance strategies that balance economic, social, and ecological objectives under climate change.

Program valid as at 6th February 2026

3MT - Pre-selection Round

12:50 - 13:30 Thursday, 12th February, 2026

P Riverbank R2

Chair: Masood Azeem

3MT - Pre-selection Round

12:50 - 13:30 Thursday, 12th February, 2026

P Riverbank R3

Chair: Arif Watto

3MT - Pre-selection Round

12:50 - 13:30 Thursday, 12th February, 2026

P Riverbank R4

Chair: Abebayehu Geffersa

3MT - Final Round

13:30 - 14:00 Thursday, 12th February, 2026

P Riverbank R5

Chair: Masood Azeem

Invited Speaker: Assoc Prof. Tim Nelson - Reviewing the National Electricity Market. Sponsored by Department for Energy and Mining

14:00 - 15:00 Thursday, 12th February, 2026

P Riverbank R2

Invited Speaker: Assoc Prof. Nazmun N. Ratna - Beyond the Binary: Traversing Research Paradigms for Gender-Transformative Agricultural Policy

14:00 - 15:00 Thursday, 12th February, 2026

P Riverbank R3

Invited Speaker: Dr. Rick Llewellyn - Sustaining change in a new agricultural RD&E landscape. Sponsored by CSIRO and GRDC

14:00 - 15:00 Thursday, 12th February, 2026

P Riverbank R4

Pre-AGM Member Q&A Session with the AARES Board

15:00 - 15:30 Thursday, 12th February, 2026

P Riverbank R2

Parallel Session: International Trade

15:30 - 17:10 Thursday, 12th February, 2026

P Riverbank R2

Chair: Kym Anderson

An Empirical Examination of Productivity, Market Power, and Export Competitiveness of Japanese Agricultural Corporations: Evidence from Nationwide Survey Microdata

Qi Dong

University of Niigata Prefecture, Niigata City, Japan

Keywords:

20. International Trade

23. Market Design and Policy

27. Productivity and Efficiency

Paper Abstract:

Japanese agriculture has long been regarded as lacking international competitiveness and export capacity due to high production costs and a heavy reliance on subsidies. Structural challenges, including an aging population, labor shortages, and fragmented farmland, have further exacerbated these problems. In response, policymakers have actively promoted the incorporation of farms into agricultural corporations as well as the expansion of agricultural exports. Notably, the 2021 revision of the Special Measures Act on Facilitating Investment in Agricultural Corporations explicitly positioned agricultural exports as a national strategic goal.

Existing research in international trade and firm behavior suggests that firms with higher productivity are more likely to enter export markets (Melitz, 2003; Sahoo et al., 2022). Moreover, many studies emphasize that market power, reflected in markups, sales channel concentration, or bargaining capacity, also plays a crucial role in determining export competitiveness (De Loecker and Warzynski, 2012; Jafari et al., 2023). However, empirical evidence in the agricultural sector, particularly for Japanese agricultural corporations, remains scarce.

This study addresses these research gaps by empirically examining the interrelationships among productivity, market power, and export competitiveness using nationwide microdata from a survey of Japanese agricultural corporations. Based on a cross-sectional sample of 1,401 corporations, we employ a three-stage empirical strategy. First, we calculate labor productivity and productive efficiency. Second, we estimate firm-level markups following the method of De Loecker and Warzynski (2012). Third, we analyze how productivity and markups influence both export participation and export intensity through regression analysis, and we further compare outcomes across distinct subsectors.

Our results show that, on average, estimated productive efficiency is higher for exporting agricultural corporations than for non-exporters (0.11 vs. -0.02). We also find that estimated markups are higher for exporters than for non-exporters (6.2 vs. 5.9). Finally, both markups and productive efficiency have a significant and positive effect on the probability of exporting. These findings confirm that productivity, market power, and exporting are positively interrelated in Japanese agriculture, with the relationship particularly pronounced in the vegetable production subsector. From a policy perspective, measures that foster productivity growth and strengthen the market position of agricultural corporations-such as technological support, labor stabilization, and market channel development-are likely to enhance Japan's agricultural export competitiveness.

Do Political Ties Shape Pollution Haven Effects? Environmental Evidence from China's Outward Investment

Tianqi Chen

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Keywords:

14. Environmental Economics

20. International Trade

Paper Abstract:

As China has emerged as a major global investor, debates have intensified over whether its outward foreign direct investment (OFDI) increases environmental pressure in host countries. While most studies examine this issue through the "pollution haven" hypothesis, the role of political relations remains underexplored. Political proximity may weaken environmental oversight by easing the entry of investment into resource-intensive sectors, but it may also strengthen cooperation on sustainable development. These contrasting effects make political relations a crucial yet overlooked factor in understanding the environmental consequences of China's OFDI. This study uses panel data from 2005 to 2022 and applies fixed-effects regression analysis. A distinctive feature of the data is that it combines aggregate OFDI flows with project-level investments above USD 100 million, allowing us to capture both macro patterns and sectoral details. The findings suggest that Chinese OFDI alone does not systematically increase pollution in host countries. However, once political proximity is considered, the marginal effect of investment on pollution becomes positive and significant. To test the robustness of these results, we conduct a broad set of checks, including alternative environmental indicators, short-term diplomatic interactions, exclusion of extreme investment cases, variation across international alliances, and time windows around key global and domestic events. Mechanism analysis further explores the roles of investment composition, host-country development levels, and vulnerability to climate change. The evidence indicates that this outcome should not be interpreted as deliberate pollution transfer. Instead, it reflects the host country's conditions, such as its stage of development, energy mix, and efficiency levels. Political proximity shapes how these structural factors interact with investment, resulting in differentiated environmental

outcomes. By linking international investment, political relations, and environmental change, this study highlights the governance challenges of cross-border capital flows. The results suggest that incorporating environmental safeguards into bilateral and multilateral investment frameworks is essential for balancing economic cooperation with the goals of global energy transition and climate policy reform.

Deal or No Deal: Impacts of US Tariffs on Australian Exports

DAVID VANZETTI

The University of Western Australia, Perth, Australia

Keywords:

20. International Trade

25. Policy Analysis

Paper Abstract:

President Trump's 2025 "Liberation Day" tariffs were intended to rebalance the US trade deficit. Although subsequently moderated, the measures functioned largely as leverage for bilateral trade negotiations. Most partners sought exemptions or new deals, while China imposed reciprocal tariffs. These actions have reshaped trade flows, with significant implications for Australian exporters.

This paper assesses these impacts using the GTAP computable general equilibrium model, applying tariff shocks derived from official US annexes and partner retaliation announcements, aggregated to GTAP sectors. Three scenarios are examined: (i) Liberation Day, with a 10 per cent US baseline tariff and add-ons of around 25 percentage points on China, 20 on the EU, and 10 on others, adjusted for Annex II and Section 232 exemptions; (ii) Reciprocity, where partners impose equivalent tariffs on US exports; and (iii) Global Realignment, in which the US scales back tariffs for most partners except China, which maintains higher protection.

Preliminary results indicate that Australia gains modestly in real GDP but faces a deterioration in its trade balance as exports fall, but imports are maintained. Agricultural effects are mixed: coarse grains and cotton expand into markets vacated by US exporters, while beef and wheat exports face intensified competition from Canada. Overall, the global realignment scenario—arguably the most likely—offers both risks and emerging opportunities for Australian agriculture.

An application of GlobeTERM to tariff escalation

Glyn Wittwer

Victoria University, Melbourne, Australia

Keywords:

12. Econometric Modelling

20. International Trade

Paper Abstract:

GlobeTERM extends the sub-national TERM methodology to provide sub-national detail in one or many regions of GTAP. In each model, the master database includes 74 sectors, based on GTAP with electricity split into 9 generation sectors plus a distribution sector. The other 64 sectors are those in GTAP Data Base version 11c. The application presented here concerns tariff escalation.

Forces behind South Australia's unusual structural changes since 1840

Kym Anderson

Adelaide University, Adelaide, Australia. ANU, Canberra, Australia

Keywords:

10. Development Economics

20. International Trade

Paper Abstract:

The agricultural sector's share of GDP in growing economies typically declines but, for a century from the early 1850s, Australia's did not. A flatline trend was most evident in South Australia (SA), where that share declined on average less than 1 percentage point per decade for eleven decades – and has been flat at 5% since 1980. The sector's share of SA's merchandise exports also has flatlined since 1980, at around 50%. Meanwhile, those shares for the rest of Australia have declined from 5% to 2% in the case of GDP and from 45% to 15% in the case of exports. This paper seeks to shed light on the forces behind the unusual evolution of these two sectoral shares for SA. Complete time series of annual data over the past two centuries are available for only a small number of potential explanatory variables for this jurisdiction, hence comprehensive econometric analysis is not possible. Even so, empirical evidence is compiled to suggest various partial explanations. They include the huge land area per capita, clearly defined and enforced property rights from the outset of European settlement, subsidies to labour immigration from the sales of farmland and mine sites, rapid declines in initially high intra-colonial, inter-colonial and ocean transport costs for farm products, the absence of a need to do any processing of the main exports during that period (copper, wool and wheat), farm machinery innovations, a strong public agricultural research and education system, the absence of major mining booms after the copper finds in the 1840s and 1860s and, in the most-recent half-century, the phasing out of manufacturing protection. The paper concludes by speculating on the future structural transformation of the SA economy.

Parallel Session: Grains & Crops: Sponsored by GRDC

15:30 - 17:10 Thursday, 12th February, 2026

P Riverbank R3

Chair: Mikayla Bruce

Whole-Body Thinking for Better On-Farm Decisions: A Behavioral Science Framework for Risky decision review in Australian Grain Systems

Brendan Brown

CSIRO, Adelaide, Australia

Keywords:

1. Agribusiness

15. Farm Management and Farmer Behaviour

18. Grains and Cropping Systems

26. Practice Change and Adoption

28. Uncertainty and Risk

Paper Abstract:

Australian grain growers make complex, high-stakes decisions under conditions of risk and uncertainty, where both technical and behavioural factors interact. While decision-support tools and agronomic advice often emphasise data, calculations, and practical considerations, less attention is given to subconscious, emotional, and perceptual processes that strongly influence decision outcomes. This imbalance limits the effectiveness of extension efforts and constrains the capacity of the agrifood sector to transform in response to climate and market challenges.

To address this gap, a 'Whole-of-Body Thinking' structured approach for reviewing decision-making processes through a behavioural science lens is proposed. The framework prompts participants to reflect on five domains of decision-making — head (analysis and data), hands (practicalities and resources), heart (values, relationships, identity), gut (rules of thumb, heuristics, experience), and eyes (framing, assumptions, biases). Rather than prescribing "correct" decisions, the framework enables participants to critically examine their own processes, recognise hidden influences, and identify strengths and blind spots.

Applied with participants in South Australia reviewing their post-sowing nitrogen rates, participants self-assessed their performance and the perceived importance of 18 reflective statements covering the five domains. Results highlight substantial heterogeneity in decision-making approaches**.** Approximately 42% of participants were head-oriented, 27% were gut-oriented, and 31% displayed a more balanced profile. Only one respondent could be considered predominantly calculation-oriented, while others distributed their decision effort across

multiple domains. Importantly, while growers generally felt confident in head (data) and hands (practicalities), they reported weaker capabilities in heart, gut, and eyes — particularly in moderating emotional memory, recognising identity and relationship influences, and defining assumptions or decision boundaries. For example, 41% reported being unable to control emotional memory in decision-making, despite 81% feeling comfortable adapting practical farm constraints.

A key insight is that growers often undervalue domains they also identify as weaknesses: heart and eyes were both perceived as less important and less well executed, even though these factors can strongly shape decision quality. Ninety-two percent of participants identified at least one important decision component they did not do well, and over half identified four or more such gaps.

These findings suggest significant opportunities for embedding behavioural science in agricultural extension and decision support. By making subconscious and non-analytical elements of decision-making more visible, the Whole-of-Body Thinking framework provides a practical, scalable tool to support reflective practice, uncover blind spots, and improve decision quality.

Overall, this work demonstrates the value of integrating behavioural frameworks into agricultural risk management, helping researchers, advisors, and growers better understand how decisions are truly made — and where leverage points exist to enable more resilient, transformative agrifood systems.

A Behavioural Economic Analysis of Grain Storage Decisions

Benedict White[1], Fiona Dempster[1], Marit Kragt[1], Rick Llewellyn[2], Jon Sarmiento[3]

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Keywords:

18. Grains and Cropping Systems

28. Uncertainty and Risk

Paper Abstract:

Grain sales out of storage can be viewed as an irreversible decision to reduce the quantity stored either on farm or in bulk storage, for instance, Cooperative Bulk Handling in Western Australia. The irreversibility of this decision has led several authors, notably Fackler and Livingston (2002), to analyse the sale decision using a financial option valuation model. Results from this model show that risk neutral producers should store grain until the price reaches a cut-off price and then sell all grain stored. This application is for U.S. crop producers where access to futures markets ensure that, on average, the expected return on storage is positive. From our Bayesian analysis of the wheat price for the Kwinana port zone in Western Australia, there is strong evidence of stochastic volatility and highly variable returns including significant periods where returns to storage are negative. Further, aside from forward sales, there are

limited opportunities for farmers in WA to hedge price risk with futures contracts. A stochastic dynamic programming version of the Fackler and Livingston model indicates that risk neutral producers should often sell just after harvest. Expected utility and prospect theory models for dynamic choice give the same solution as the risk neutral model over a plausible range of risk aversion, loss aversion, and probability weight parameters. Producers, on the other hand, in focus group discussions as part of the GRDC RiskWi$e project, apply a range of heuristics ('rules-of-thumb') to determine their selling strategy. Two notable heuristics are first, waiting until the grain price exceeds a predefined 'target price', and second, spreading sales over the storage period. This paper compares the performance of these heuristics to an 'optimal' stochastic dynamic programming solution.

Price asymmetries between Australian and global wheat markets: Implications for Australian wheat growers

YADAV PADHYOTI, Amin Mugera, Benedict White, Fiona Dempster

Department of Agricultural and Resource Economics, UWA, Perth, Australia

Keywords:

20. International Trade

23. Market Design and Policy

Paper Abstract:

Abstract
Price transmission between spatially distinct markets is a fundamental characteristic of markets and their structure. The agricultural economics literature has extensively explored the relationship between regional and international markets. However, little is known about the dynamic relationships between the Australian and global wheat markets, particularly considering all the complexities of agricultural commodity prices, such as non-linearity, asymmetry, structural breaks and heteroskedasticity. This study examines the dynamic relationships between Australian and global wheat markets by employing the Non-Linear Autoregressive Distributed Lag Model, which allows for nonlinearity and asymmetry, and its extension in the GARCH framework to account for clustered price volatility. The analysis covers daily spot prices for the Australian grain ports of Kwinana in Western Australia and Newcastle in NSW, as well as CBOT and Euronext futures prices, which serve as indicators of global wheat prices, from April 2015 to April 2025. There are two main results. First, a symmetric long-run relationship exists between the Australian spot prices and global wheat market prices. Second, there is a short-run negative asymmetry in price transmission from CBOT and Euronext wheat futures to Kwinana wheat spot prices, suggesting that sharp reductions in wheat futures prices are transmitted more rapidly and with a greater magnitude than positive shocks. In contrast, a short-run asymmetric relationship exists between Newcastle wheat spot and wheat futures prices at CBOT and Euronext. This indicates that WA traders take advantage of global wheat price dynamics to expand their margin, potentially reducing the producer surplus of WA wheat growers. This may be due to market power by oligopolistic wheat traders, as well as

asymmetric price reporting and asymmetric information in the WA market. Grain market stakeholders and policy actors should explore avenues to enhance competition in WA wheat markets and promote access to real-time price information for all stakeholders. Further study could also explore the behavioural biases among WA wheat growers in choosing oligopolistic wheat traders to market their wheat and recommend behavioural change communication among WA wheat growers.

Keywords: commodity markets, price asymmetry, spot prices, futures prices.

On-Farm Storage in Grain Deficit Regions: Profitability, Heterogeneity, and Tropical Storm Risks

Nicholas Piggott, John Robinson

North Carolina State University, Raleigh, USA

Keywords:

15. Farm Management and Farmer Behaviour

18. Grains and Cropping Systems

Paper Abstract:

Research on on-farm grain storage has emphasized its role in enhancing profitability, reducing price risk, and improving harvest logistics. However, most studies assume homogeneous producers and fixed storage costs, overlooking the variability that exists in real-world operations. This study examines the impact of heterogeneity in physical storage costs, climates, and local market conditions on the profitability of corn and soybean storage across six locations in North Carolina. Using expert panel data, we estimate facility investment costs and simulate on-farm storage strategies based on cost structures and operator decisions, applying a straightforward grain storage decision rule to estimate annual net returns. Results show economies of scale in investment costs and demonstrate that annual net returns are strongly influenced by cost heterogeneity, regional climates, and infrastructure, underscoring their importance when evaluating on-farm storage investments. We evaluate the profitability of on-farm storage in investments using a moving block bootstrap procedure and find that, on average, investments in on-farm storage yield positive Net Present Values (NPVs) for both crops. Soybean storage is consistently and statistically profitable, but corn storage returns are not statistically distinguishable from break-even due to higher per-bushel physical storage costs and fewer carry opportunities, demonstrating a greater risk associated with corn storage.

Risks and vulnerabilities in the Australian canola supply chain: insights from Best-Worst Scaling

Mikayla Bruce, Rico Ihle

Wageningen University, Wageningen, Netherlands

Keywords:

18. Grains and Cropping Systems

30. Value Chain Analysis and Marketing

Paper Abstract:

This paper seeks to identify the main economic vulnerabilities faced by the Australian canola supply chain from the perspective of its stakeholders.

The Australian grains industry is a major contributor to Australian agriculture, accounting for an average 29% of the gross farm production value (ABARES 2025a). Within the grains industry canola is the 2nd largest contributor after wheat, generating an average gross value of $4.2 billion (ABARES 2025b). The significance of Australian canola extends into the global market, where Australia is the 2nd largest exporter accounting for 29% of global exports (GRDC 2024). The Australian canola supply chain is globally integrated with many inputs into production and distribution such as fertiliser, chemicals and fuel sourced overseas (Varrall and Ginger 2020). The vulnerability of the supply chain to global disruptions has been highlighted in the past 5 years, with input and logistics disruptions triggered by the COVID-19 pandemic, including AdBlue and shipping container shortages, Russia's invasion of Ukraine and the blockage of the Suez Canal (Greenville et al. 2020, House of Representatives Standing Committee on Agriculture, 2023). Global market uncertainty and concerns regarding changing trade policies have sparked a renewed need to assess the risks and vulnerabilities in the Australian canola supply chain (Swan et al. 2025).

This analysis uses a desktop study of literature, industry reports and trade data to firstly map the structure of the global and Australian canola supply chains and the evolving market concentration since 2000. Secondly, it develops a conceptual framework for Supply Chain Resilience (SCR) to the Australian canola supply chain, to deduce the theoretical impact of major risks to the supply chain (Tukamuhabwa et al. 2015). Thirdly, it identifies [RI1] [MB2] challenges noted in literature that pose a threat to the supply chain, as well as shocks experienced since 2000. Finally, it analyses the dominating patterns in the vulnerabilities in the Australian canola supply chain identified by stakeholders using Best-Worst Scaling.

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Parallel Session: Climate Change & Agriculture

15:30 - 17:10 Thursday, 12th February, 2026

P Riverbank R4

Chair: John Kandulu

From Screens to Schemes: Does Internet-connected Smartphone Use Drive Climate-Smart Agriculture among Indian Potato Farmers?

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Keywords:

8. Climate Change

26. Practice Change and Adoption

Paper Abstract:

Abstract

Digitalization is widely recognized as a pivotal strategy for facilitating the transition toward sustainable agricultural production and fostering long-term rural development. This lends an opportunity to developing nations to conquer the negative impacts of climate change on their food production. With this in mind, we attempt to unveil the role of internet-connected smartphone use in determining potato farmers' climate-smart agricultural (CSA) practice adoption using the case of potato cultivation in India. Utilizing the conditional mixed process model to analyze the 730 samples of Indian potato farmers, our study finds that internet-connected smartphone use is positively and significantly associated with the number of CSA practices adopted. A closer look indicates that potato farmers owning assets and cultivating medium-sized farmland tend to adopt more CSA practices, from using internet-connected smartphones. Meanwhile, the impact of internet-connected smartphone use on the number of CSA practices adopted is more pronounced for potato disease victims and farmers' organization non-members than their counterparts. Our results also indicate that a higher level of internet-connected smartphone use frequency encourages farmers to adopt more CSA practices in their potato cultivation. In view of this, our study suggests that policymakers should attach special importance to promoting the use of internet-connected smartphones among farmers in seeking sustainable agricultural production and a stable food supply. More importantly, policy instruments penetrating internet-connected smartphone use should be targeted at specific groups of farmers.

Assessment of Carbon Footprint of Rice Production in Cambodia: Life Cycle Assessment

Vibol SAN[1], Rido THATH[1], Vin Spoann[1], Panharoth Chhay[2], Rida Akzar[2], Alexandra Peralta[2]

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Keywords:

3. Agricultural Production

7. Carbon and Nature Markets

8. Climate Change

Paper Abstract:

Food security, aligned with SDG 2 (Zero Hunger), is central to global development, with agriculture employing 1.23 billion people worldwide (FAO, 2024). In Cambodia, rice production—concentrated along the Mekong River and Tonle Sap Lake—has steadily expanded, with yields rising about 2% annually through intensive practices (RGC, 2022). However, agriculture significantly contributes to climate change, generating 10–14% of global greenhouse gas (GHG) emissions, mainly from nitrogen fertilizer use, responsible for 70% of N_2O emissions (UN Environment, 2019). Cambodia's rice cultivation produced 7.3 million tonnes CO_2e in 2010, projected to reach 16.0 million tonnes (MoE, 2022). Life cycle assessment (LCA) is a systematic tool to measure these emissions and design mitigation strategies, yet it has not been applied to Cambodian rice. This study fills that gap by evaluating the carbon footprint of rice farming in provinces, highlighting emission drivers and offering policy insights for sustainable agriculture.

From August to September 2024, a field survey was conducted to collect data on rice production during the rainy season and dry season in Kampong Cham and Kandal provinces. Using random sampling, ten rice-farming households were selected from ten villages in each province, resulting in 200 households interviewed. A reconnaissance survey preceded household interviews to understand village characteristics, the number of rice farmers, and other relevant variables. Data collected for each season included grain yield, farm size, crop cultivar and duration, agricultural inputs (seed, fertilizer composition, and pesticides), farming operations (machinery use for land preparation and harvesting), and irrigation management (flooding and drainage patterns). Fertilizer NPK composition and pesticide active ingredients were verified using product packaging information. The study applied the LCA method to measure the carbon footprint of rice production. The LCA followed a cradle-to-gate boundary, encompassing all processes up to harvest, from the production of inputs to on-farm activities. Post-harvest processes were excluded. This approach provided a systematic assessment of emission sources and environmental impacts directly linked to rice farming practices in the two provinces.

The result shows that the carbon footprint per hectare and per tonne of paddy of the rainy season was 7.21±2.18 t CO_2-eq/ha and 1.72±0.86 t CO_2-eq/t, which was higher than that of the dry season crop (5.93±2.91 t CO_2-eq/ha and 1.76±0.90 t CO_2-eq/t). The direct methane emissions during growth were the highest contributor to GHG emissions, accounting for 53.56% of the total C footprint of the dry season crop and 58.82% of that of the rainy season crop. The fertilizer emissions for dry and wet season crops were also significantly accounting for 12.79%

and 10.42%, respectively. Rice straw management, water management, energy use for irrigation and field operation, and longer rice growth duration were also the factors that contributed to a higher C footprint. To reduce the C footprint of rice production in Cambodia, rice straw management without direct incorporation and burning, water management using intermittent irrigation, appropriate use of N-fertilizer, reduction of energy use for crop production, and short-duration rice varieties with high yield should be adopted.

Climate Change and Pulse Crop Productivity in Pakistan: An Empirical Assessment

saima rani saima rani

The University of Queensland, Brisbane, Australia. Pakistan Agricultural Research Council, Islamabad, Pakistan

Keywords:

3. Agricultural Production

8. Climate Change

25. Policy Analysis

Paper Abstract:

Climate change is increasingly recognized as a major contributor to food insecurity, driven by rising food prices and declining agricultural output. Water scarcity, exacerbated by overextraction and prolonged droughts, poses a significant threat to crop production. Moreover, extreme weather events—such as heatwaves and severe droughts—are closely linked to climate variability and have been shown to reduce agricultural productivity, thereby diminishing farm profitability.

This study investigates the impact of climatic factors on the production of two key pulse crops—chickpea and mungbean—in Pakistan. Using secondary data from 1990 to 2022 across ten major pulse-producing districts, the analysis examines the relationship between various climatic and non-climatic variables and crop performance. The findings reveal that rainfall during the sowing period positively influences the yields of both chickpea and Mung bean. However, rainfall during the growing season benefits chickpea production while adversely affecting Mung beans. Rainfall during the harvesting period shows no statistically significant effect on chickpea but negatively impacts mungbean yields.

Temperature also plays a critical role: elevated maximum temperatures during the chickpea growing season are associated with reduced yields, whereas higher temperatures during the mungbean maturity phase positively influence its production. Overall, the study concludes that the area under cultivation, yield, and production of chickpea and Mung bean are highly sensitive to climatic conditions. These findings underscore the urgent need for policymakers and agricultural scientists to develop and disseminate climate-resilient technologies and practices to safeguard pulse productivity in the face of future climate challenges.

Solar Irrigation and Agricultural Resilience in Semi-Arid Economies: Evidence and Cost–Benefit Insights from Eritrea

Daniel Beyene

University of Pretoria, Pretoria, South Africa

Keywords:

8. Climate Change

19. Impact Assessment

25. Policy Analysis

26. Practice Change and Adoption

27. Productivity and Efficiency

Paper Abstract:

Access to affordable energy is central to agricultural transformation in arid and semi-arid economies. In Eritrea, limited electrification and rising fuel costs constrain irrigation, while solar technology offers a sustainable alternative. This study uses cross-sectional data from 314 smallholder maize farms across Eritrea's major production zones. The survey collects detailed information on crop yields, irrigation practices, input use, household income, and energy expenditure. To capture environmental heterogeneity, we integrate geo-referenced rainfall and solar irradiation data, enabling an analysis of how solar irrigation adoption interacts with agroecological conditions.

The study applied propensity score matching and instrumental-variable regressions to estimate the treatment effect of solar adoption on yield, income, and production costs, correcting for selection bias. Results show that adopters achieve 13–18% higher maize yields and 25% lower fuel expenditure than comparable non-adopters. Heterogeneity analysis reveals larger benefits for medium-sized farms and farms in regions with higher solar irradiance. The stochastic CBA shows a positive NPV in 81% of simulations, with a mean BCR of 1.9, even under conservative assumptions. Risk analysis indicates that solar irrigation reduces exposure to energy price volatility and rainfall uncertainty, highlighting its role in enhancing both productivity and climate resilience.

The study findings suggest that solar irrigation can deliver substantial economic and resilience benefits, justifying targeted policies to support adoption. Blended finance mechanisms, subsidies for initial capital costs, and localised maintenance services could accelerate uptake among smallholders. These results provide a model for scaling solar irrigation across semi-arid regions in Eritrea and similar developing-country contexts, enhancing food security and sustainable agricultural development.

Mitigating climate risk and maximising the use of reclaimed water in irrigated agriculture

John Kandulu

Flinders University, Adelaide, Australia

Keywords:

1. Agribusiness

28. Uncertainty and Risk

Paper Abstract:

This study develops an enterprise-level economic model to identify key drivers shaping the uptake of reclaimed water by agribusiness in South Australia. Previous analyses have typically assumed that all water-using operations benefit equally from increased supply, yet exposure to the risks of price and availability varies substantially between farm types. Here, detailed data from the Northern Adelaide Irrigation Scheme are used to model profitability for four representative irrigated enterprises - winegrapes, glasshouse tomatoes, almonds, and lettuce - against a wide range of operating costs, production rates, and market prices. Using Monte Carlo simulation, the model quantifies risks and tests how variability in water price and access influences the likelihood of uptake for each enterprise. The results demonstrate that all enterprises remain profitable at current and increased water costs, but commodity price volatility is the greatest risk to margins. Distinct patterns of risk sensitivity emerge: winegrapes and lettuce growers are more responsive to water price changes and benefit most from favourable contract rates, whereas glasshouse tomato and almond producers value supply security above price. Each enterprise's reservation price for reclaimed water exceeds the prevailing market rate risk tolerance varies. The findings highlight the need for tailored agreements to improve recycled water adoption and flag the economic barriers most relevant to individual farm types, providing clear guidance for policy and scheme design.

Parallel Session: Food Consumption & Loss

15:30 - 17:10 Thursday, 12th February, 2026

P Riverbank R5

Chair: Arif Syaifudin

Collaboration for Circular Economy: A Systematic Review of Food Loss and Waste Reduction in the Agri-Food Sector

Stephanie Bayancela Briones[1], Sajad Fayezi[2,1], Matthew Knowling Knowling[1], Jungho Suh[1]

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Keywords:

1. Agribusiness

26. Practice Change and Adoption

Paper Abstract:

Purpose

Food loss and waste (FLW) constitutes 31% of global food production, generating significant adverse environmental, economic, and social implications. The Circular Economy (CE) has emerged as a promising model for implementing sustainability within agri-food supply chains. However, the transition from linear to circular supply chains requires major improvements, with effective supply chain collaboration being fundamental. Despite this imperative, collaborative approaches to FLW reduction remain understudied. This paper aims to advance our understanding of how supply chain actors and other stakeholders collaborate to implement CE principles for FLW reduction, and what mechanisms and conditions facilitate such collaborations.

Design/methodology/approach

This paper employs a rigorous Systematic Literature Review (SLR) methodology. From an original pool of 1322 articles, after applying screening and filtering mechanisms, a total of 31 articles were identified for our analysis. The case studies depicted in these articles allowed us to examine collaborative mechanisms and enabling conditions in CE efforts for FLW reduction, applying insights from Social Exchange Theory (SET) and Institutional Theory (IT).

Findings

Preliminary analysis reveals that FLW reduction using CE principles is being achieved by varied collaborative configurations, including formal partnerships and informal networks, each characterized by distinct governance and organizational structures. Furthermore, vertical external collaboration (among direct supply chain actors) is predominantly associated with preventive CE practices, the most preferred option in the food waste hierarchy. In contrast, horizontal external collaboration (involving stakeholders such as NGOs, government bodies,

and communities) is more often associated with practices for the reuse and recycling of food resources. Though lower in the hierarchy, these practices offer other benefits such as food relief and regulatory reforms. The study also identifies information sharing, commitment practices, and relationship management practices as the main collaborative mechanisms, along with governmental incentives and regulation as the most frequent condition facilitating CE implementation by collaborating supply chain actors.

Practical Implications

This comprehensive review and analysis of case studies provides actionable insights to support the design of collaborative strategies, inform evidence-based decision-making, and guide policy development to address FLW challenges within agri-food supply chains.

Relevance/contribution

This study addresses an important gap in the intersection of CE and supply chain collaboration in practice by synthesizing empirical evidence focused on FLW reduction efforts. Furthermore, the identification of collaborative mechanisms and facilitating conditions through the lenses of Social Exchange and Institutional Theories allow us to propose a framework for examining collaborative approaches to FLW reduction in agri-food supply chains. These insights establish a foundation for future research investigating how these mechanisms and conditions can be effectively implemented in different contexts to achieve meaningful FLW reduction.

The impact of household food organics services provision on recovery rates, diversion rates and landfill volumes: Empirical evidence from New South Wales and Victoria

SIJIA LIU

The University of Adelaide, Adelaide, Australia

Keywords:

11. Ecological Economics

14. Environmental Economics

Paper Abstract:

Food waste is an urgent problem. Households generate the most food waste in Australia. In response, the Australian Government has implemented and expanded kerbside Food Organics and Garden Organics (FOGO) collections, aiming to halve food waste by 2030. In order to evaluate the effectiveness of this service and give the exact data evidence, this paper explores the impact of FOGO services on recovery rate, diversion rate and landfill volumes in New South Wales (NSW) and Victoria (VIC) in Australia, and explores other factors influence the recovery rate, diversion rate and landfill volumes as well. It uses two unique annual datasets, one includes 1856 observations from *NSW Environment Protection Authority* (EPA), the other includes 1657 observations from *Recycling Victoria*, on waste management at the council level spanning nearly twenty years, with variables like the amount of collection from yellow, green and red bin, the service frequency, total management charge, levy rate, age, gender, population dense, SEIFA scores and so on. For methodology, this paper uses the latest

Staggered Difference in Difference approach (Callaway & Sant' Anna, 2021) that allows the unbalanced panel data with multiple policy adoption time periods and multiple treatment groups (not just 2*2 or 3*3 DiD, it's multiple*multiple). It also combines the general regression and Inverse probability weighting technique as double robust ensuring to get correct results. The result shows that councils with FOGO services, whether in NSW or VIC, exhibit significantly higher recovery and diversion rates and lower landfill volumes compared to those without FOGO services. In NSW, once they start the implementation, the FOGO service not only has positive average treatment effect to recovery and diversion rates and negative average treatment effect to landfill volumes, especially for councils that started FOGO services in 2013, 2015, 2017 and 2018, but also the FOGO effect is gradually stronger over time. However, in VIC, at first seven years (one contract period) from FOGO service be implemented, it performs very well, then after seven years the effect is not significant. That may need further discussion. In addition, in NSW, besides FOGO services, Councils with Alternative Waste Treatment (AWT) facility show significant higher recovery rates and lower landfill volumes than those without AWT facility. In both states, service frequency, household amount, population density, family construction are also the important factors that influence recovery rates, diversion rates and landfill volumes.

Beyond Appearance: Enhancing Fresh Fruit Quality through Behavioural and Systemic Change in LMICs

Nauman Ejaz[1], Thilak Mallawaarachchi[2,3]

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Keywords:

17. Food, Health and Nutrition

26. Practice Change and Adoption

Paper Abstract:

Fresh produce quality, encompassing safety standards, nutritional integrity, and consumer welfare, is pivotal for ensuring food security, sustainable resource utilisation, and market competitiveness. Despite its critical importance, in many low- and middle-income countries (LMICs), the concept of “quality” remains narrowly associated with visual appearance and aesthetic appeal, neglecting vital credence attributes of food safety and nutritional value. This disconnect translates into significant post-harvest losses, public health risks, environmental degradation, and missed opportunities for realising the full economic potential of food systems.

While considerable investment has targeted production technologies and allied trainings, the fundamental task of transforming stakeholder perceptions and practices across food value chains remains inadequately addressed. Drawing from the insights of behavioural economics and systemic analysis, this paper applies the Awareness–Motivation–Capacity (AMC) framework to explain why such transformation is particularly challenging in the LMIC context and how it can be achieved. The AMC framework suggests that change involves multiple

interconnected drivers — awareness of quality issues, motivation to prioritise safety and nutrition, and capacity to affect change — each influenced by cognitive, social, and structural factors.

We identify key cognitive biases such as halo effects, where consumers overly rely on visual cues to assess quality; price heuristics, that distort valuation process; and status quo bias, which discourages change, that shape preferences and perpetuate the tendencies, from farm to fork, to prioritise appearance over safety and nutrition. Structural barriers — including fragmented supply chains marked by weak coordination, limited enforcement of standards, and affordability constraints — further impede system-wide transformation. These constraints are compounded by weak regulatory frameworks and limited access to trustworthy certification and traceability mechanisms.

Experiences from advanced economies demonstrate that success in elevating food quality hinges on aligning consumer preferences with systemic incentives through a combination of embedded trust, transparency, and awareness. For LMICs, fostering such alignment demands behavioural nudges, context-specific interventions, and inclusive partnerships that leverage local dynamics. The Four-Ps model — Public, Private, Philanthropy, and People motives — serves as an effective framework for coordinated action and operationalisation, addressing the zero-sum reasoning that often stifles systemic change.

Our proposed transition strategy emphasises embedding trust via third-party certification, branding, transparent labelling, and community-wide awareness, coupled with systemic reforms that reinforce standards and supply chain efficiencies. Engaging women and youth, often the key change agents, enables inclusive participation and accelerates adoption of quality-oriented practices. Policy priorities include integrating behavioural insights into food safety and nutrition policies, scaling affordable certification and traceability systems, and empowering women-led enterprises within value chains.

By aligning behavioural change initiatives with systemic reforms, LMICs can progress towards safer, resilient, inclusive, and sustainable food systems that enhance productivity, nutritional outcomes, and human welfare.

Key words: Food systems, motivation, behavioural change, development practice, quality

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Women's Roles in Integrated Pest Management: Gendered Perspectives from Mango Farming in Indonesia

Apri Sayekti[1], Maesti Mardiharini[1], Handewi Saliem[1], Ening Ariningsih[1], Ashari Ashari[1], Rizghina Ikhwan[2], Saptana Saptana[1], Kartika Septanti[2], Lidya Shaffitri[2], Alison Watson[3], Stafano De Faveri[4]

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Keywords:

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

Paper Abstract:

This study examines gender dynamics in mango farming and their implications for the adoption of Integrated Pest Management (IPM) in West Java, Indonesia. Although Indonesia is among the world's leading mango producers, its export performance remains low due to persistent quality issues, notably fruit fly infestation and reliance on chemical pesticides. Guided by the Harvard Gender Analytical Framework, we conducted household surveys, focus group discussions, and key informant interviews across the mango-producing districts of Indramayu, Cirebon, and Majalengka. Findings reveal entrenched gender disparities in roles, decision-making, access to knowledge, and control over resources. Men dominate field-based and strategic tasks, while women, despite their substantial contributions in pest monitoring, sanitation, and financial management, remain under-recognized and excluded from extension services and farmer groups. Structural barriers—such as domestic care burdens, limited land tenure, and gender-blind extension systems—further restrict women's participation in IPM. The study argues that IPM effectiveness is inseparable from inclusivity. Policy recommendations include gender-responsive training, institutionalising women's leadership in farmer groups, expanding access to finance, and promoting biopesticide adoption as a safer and more inclusive technology. By integrating women's knowledge, labour, and agency into pest management strategies, PM can enhance both agricultural sustainability and gender equity.

Mapping Food Loss and Waste Policies and Programs: The Case Study of Indonesia

Arif Syaifudin, Ammar Abdul Aziz, Risti Permani

The University of Queensland, Gatton, Australia

Keywords:

1. Agribusiness

25. Policy Analysis

Paper Abstract:

According to the Food and Agriculture Organization (FAO), approximately one-third of all food produced globally is either lost or wasted, amounting to an estimated 1.3 billion tons annually in 2011. The financial cost of this food loss and waste (FLW) is estimated at approximately USD 1 trillion per year. Beyond its economic impact, FLW also contributes significantly to environmental degradation, accounting for 8% of global greenhouse gas emissions. Moreover, producing food that is ultimately lost or wasted consumes 24% of freshwater resources, 23% of cropland, and 23% of fertiliser inputs. These figures underscore the urgent need for comprehensive and effective actions to reduce FLW.

To this end, various initiatives have been implemented to reduce FLW. FLW reduction was also included as a target under Sustainable Development Goal (SDG) 12 in 2015, which has helped catalyse international commitment toward addressing the issue. However, while existing studies often focus on technological and capacity-building interventions, policy-based

interventions remain underexplored despite their potential for systemic impact, particularly in developing countries.

Therefore, this study aims to fill that gap by examining the policy landscape related to FLW with a case study of Indonesia. It maps existing policies and programs, identifies their coverage and priorities, and assesses gaps in their design, implementation, and monitoring frameworks. A multi-step methodology, combining a document analysis and government interviews, was employed to conduct this case study.

As a preliminary result, the study identified 17 national policy documents from 2021 to 2025 that directly address the issue of FLW in Indonesia. These documents vary in terms of their position in the policy hierarchy, with the majority classified as guidance, and only a limited number constituting legally binding government regulations. In terms of policy approach, information-based strategies, such as awareness campaigns, dominate the current landscape. This indicates that Indonesia's efforts to reduce FLW largely rely on voluntary actions rather than enforceable mandates or economic instruments.

Furthermore, there is evidence of the need to enhance coordination between government institutions, which can help resolve fragmented policy implementation. Divergent priorities, such as a focus on food security by some institutions and an emphasis on the circular economy by others, underscore the importance of aligning institutional priorities and adopting a more integrated approach. Additionally, the availability of comprehensive and reliable data on FLW is identified as a critical need to ensure a more effective monitoring and evaluation of current interventions, particularly considering the existence of national FLW reduction targets.

Based on these findings, the study recommends several key actions to strengthen FLW-related policies and programs in Indonesia. These include promoting a more participatory policy-making process that engages a broad range of stakeholders, improving coordination mechanisms among actors, and establishing a comprehensive evaluation framework supported by reliable data collection systems. Additionally, integration of policy-based interventions with market-based solutions could be considered to enhance overall effectiveness. Strengthening these areas is critical to achieving national and global FLW reduction targets, particularly those outlined under SDG 12.

Parallel Session: Development & Environment

15:30 - 17:10 Thursday, 12th February, 2026

P Riverbank R6

Chair: Pallavi Shukla

Women's Participation in Farmer Household Decision-Making Related To Land Conversion in The Citarum Watershed, Gununghalu Sub-District, West Bandung Regency

Maura Zhafira Putri[1], [2]

[1]Universitas Padjadjaran, Bandung, Indonesia. [2]

Keywords:

10. Development Economics

21. Land and Natural Resource Management

Paper Abstract:

The transformation of forest land into plantations in the Citarum watershed, West Bandung Regency, is on the rise and threatens to diminish productive land, jeopardizing the viability of the agricultural system and the environmental equilibrium in the area. Women's involvement plays a crucial role in maintaining biodiversity and suppressing land conversion due to their tendency to be more careful in managing resources. This study seeks to evaluate the extent of women's involvement in household decision-making about land conversion and determine the factors that affect land conversion. This study employs a quantitative, including survey and comprehensive interviews with 200 participants, comprising husbands and wives from 100 plantation farming homes in the Citarum watershed region, Gununghalu Sub-district, West Bandung Regency. The level of women's participation was assessed using the Harvard Analytical Framework (HAF), and its contributing components were examined through multiple linear regression analysis. Findings indicate that women have very limited access to information and ideas, as well as limited control over final decision-making and its implementation. Therefore, the overall level of women's participation in land conversion decision-making can be categorized as low. Increased women's participation correlates with a decrease in land conversion, one of the main factors of which is economic factors. This study recommends the need to increase women's capacity and empowerment, strengthen their role in deliberations and community forums, and support empowerment programs to increase women's involvement in household decision-making and reduce the tendency for land conversion.

Downstream Impacts of Mines on Agriculture in Africa

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Keywords:

10. Development Economics

21. Land and Natural Resource Management

Paper Abstract:

Mining operations in Africa are expanding rapidly, creating negative externalities that remain poorly understood. In this paper, we provide causal evidence for the impact of water pollution from mines on downstream vegetation and agriculture across the continent. We exploit a natural experiment, where mines cause a discontinuity in water pollution along river networks, to compare vegetation health in upstream and downstream locations. We find that mines significantly reduce peak vegetation downstream by 1.3–1.5%, impairing the productivity of over 74,000 km2 of croplands. These reductions correspond to annual losses of 91,000–205,000 tons of cereal crops in the immediate vicinity alone, with particularly severe effects in fertile regions and areas where gold mining predominates. Our findings highlight substantial externalities of mining and demonstrate an urgent need for oversight and regulation.

Evaluating the Impact of Organic Farming Adoption on Household Food Security: Insights from Indonesian Rice Farmers

Fahriyah Fahriyah, Rachman Hartono, Susanti Evie Sulistiowati

Universitas Brawijaya, Malang, Indonesia

Keywords:

10. Development Economics

11. Ecological Economics

19. Impact Assessment

Paper Abstract:

Organic farming has been widely promoted as a sustainable agricultural approach that enhances environmental health, food safety, and long-term productivity. However, the transition from conventional to organic production often involves substantial economic and technical challenges that may affect household welfare and food security. Organic farmers frequently face limited access to modern inputs, fluctuating yields, and certification barriers that can temporarily reduce income stability. Understanding whether organic farming improves household food security is therefore critical for designing inclusive agricultural policies in developing countries. This study investigates the impact of organic farming adoption on household food security among 200 rice farmers in East Java, Indonesia, using the Inverse Probability Weighted Regression Adjustment (IPWRA) method. The approach combines the strengths of propensity score weighting and regression adjustment to account for potential selection bias and estimate the average treatment effect of organic adoption on food security

outcomes. Household food security was measured using the Food Consumption Score (FCS) and Food Insecurity Experience Scale (FIES) indicators, capturing both consumption diversity and food access dimensions. The results reveal that households adopting organic farming exhibit significantly higher food security levels compared to conventional farmers. Organic adopters benefit from improved food availability and dietary diversity, attributed to better resource management, cooperative networks, and market access for organic products. The findings highlight that organic farming can serve as a pathway to sustainable livelihoods and resilient food systems when accompanied by institutional support, extension services, and market facilitation mechanisms.

Entrepreneurial Orientation and the Adoption of Climate-Smart Agriculture Practices: Evidence from Rice Farmers in Indonesia

Mukhammad Kholid Mawardi[1], Mohammad Ilyas Shaleh[2]

[1]Universitas Brawijaya, Malang, Indonesia. [2]National Pingtung University of Science and Technology, Pingtung, Taiwan

Keywords:

8. Climate Change

10. Development Economics

12. Econometric Modelling

Paper Abstract:

Entrepreneurial orientation (EO) has emerged as a key behavioral determinant of innovation and adaptive capacity in smallholder farming systems. In the context of climate change, farmers with higher entrepreneurial orientation characterized by proactiveness, innovativeness, and risk-taking are more likely to adopt Climate-Smart Agriculture (CSA) practices that enhance productivity, resilience, and environmental sustainability. However, empirical evidence linking entrepreneurial traits to multidimensional CSA adoption remains limited in developing countries, particularly in Southeast Asia. This study investigates the impact of entrepreneurial orientation on the adoption of multiple CSA practices among 300 rice farmers in East Java, Indonesia. Using the Multivariate Probit (MVP) model, the analysis captures interdependence across adoption decisions for several CSA components, including soil conservation, water efficiency, organic fertilization, and integrated pest management. The model accounts for correlated unobserved factors influencing simultaneous adoption choices, providing more accurate insights into farmers' decision-making processes. The results show that higher levels of entrepreneurial orientation significantly increase the likelihood of adopting multiple CSA practices. Specifically, proactiveness and innovativeness have the strongest positive effects, while risk-taking plays a moderate role in technology experimentation. Furthermore, access to extension services, credit, and farmer group participation enhance the magnitude of EO's influence on CSA adoption. These findings imply that strengthening farmers' entrepreneurial orientation is essential for accelerating CSA diffusion and improving resilience to climate

variability. Policies that integrate entrepreneurship development with climate-smart training could foster more adaptive and sustainable rice farming systems in Indonesia.

Agri-Environmental Impacts of Poverty Reduction Programs: Evidence from India

Pallavi Shukla[1], Hemant Pullabhotla[1], Amrutha Varshini[2]

[1]Deakin University, Melbourne, Australia. [2]University of Illinois at Urbana Champaign, Urbana Champaign, USA

Keywords:

10. Development Economics

14. Environmental Economics

Paper Abstract:

Economic development and environmental conservation are often portrayed as competing objectives, with poverty reduction programs sometimes producing unintended environmental consequences. Initiatives designed to alleviate poverty may degrade environmental quality by increasing household incomes and, consequently, the consumption of resource-intensive goods. Conversely, poverty reduction programs might enhance environmental quality by promoting investment in ecosystem services. Determining whether poverty reduction programs have a positive or negative impact on environmental quality is a crucial question for researchers and policymakers seeking to advance sustainable development globally.

To understand the environmental consequences of poverty reduction programs, we study the environmental impact of a cash transfer program. Cash transfer programs are widely considered one of the most remarkable innovations in poverty reduction over the past few decades. Over 63 countries – both developing and developed – have at least one cash transfer program, with a total of over 200 cash transfer programs globally. The popularity of cash transfer programs as a poverty reduction tool makes them a crucial intervention that warrants examination for their environmental impact.

We examine the world's largest unconditional cash transfer program for landholding farmers in India to assess its agri-environmental impacts. A key environmental challenge in India is particulate matter pollution from crop residue burning, which poses severe public health risks. To study this, we construct a novel national dataset that integrates administrative records with high-resolution satellite imagery on fires and forest cover, and apply an instrumental variable strategy. Our findings show that unconditional cash transfers reduce crop residue burning by 22 percent, largely because farmers use more labor to clear residues. This decline in burning leads to a 14 percent reduction in particulate matter pollution, with the strongest effects observed in areas where private health costs are highest. Overall, our results suggest that unconditional cash transfers can be a cost-effective and welfare-enhancing policy for improving air quality, underscoring the potential for poverty reduction programs to simultaneously advance environmental goals.

Parallel Session: Farm Management & Innovation

15:30 - 17:10 Thursday, 12th February, 2026

P Riverbank R6B

Chair: Thomas Nordblom

Decarbonisation Practices Among Smallholder Rice Farmers in Indonesia: Latent Class Analysis and A Multinomial Logistic Regression Applications

Iqbal Saleh Sitompul, Ammar Abdul Aziz, Md. Ali Akber, Risti Permani

The University of Queensland, Gatton, Australia

Keywords:

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

Paper Abstract:

Indonesia faces increasing rice demand while aiming to lower greenhouse gas emissions in agriculture to meet climate change commitments. Rice production is the primary source of these emissions in the agricultural sector, and the sector is predominantly made up of smallholder farmers, up to 93%. While previous studies have explored some greenhouse gas reduction strategies, a significant challenge lies in increasing smallholder farmers' awareness and adoption of decarbonisation practices. There is a lack of empirical research on the human dimensions of adoption, particularly regarding farmers' adoption and the socioeconomic and institutional factors that affect the adoption of decarbonisation practices. Understanding these factors is crucial for designing effective climate change mitigation interventions.

Therefore, this study aims to assess the adoption of decarbonisation strategies among smallholder farmers in peri-urban Java, Indonesia, focusing on practices such as crop diversification, fallowing, the use of organic fertilisers, water management, direct seeding, and straw management. This study utilises data from a project funded by the Department of Foreign Affairs and Trade (DFAT) through the Knowledge Partnership Platform for the Australia-Indonesia Collaboration on Knowledge, Innovation, and Technology (KONEKSI), led by the University of Queensland, which focuses on the peri-urban food supply systems of Java, Indonesia, during the years 2023-2024. Using survey data from 391 smallholder farmers in 12 sub-districts in Java peri-urban areas surrounding major cities like Jakarta, Surabaya, and Yogyakarta, the study applied latent class analysis combined with multinomial logistic regression to identify rice smallholder farmers' adoption of decarbonisation practices and their determinants. Preliminary findings suggest that the adoption of decarbonisation practices varies significantly, with several factors influencing these adoption patterns, including years of formal education, participation in farmers' groups, and gender, among others. The data also suggest that a large majority of farmers are of senior age with a low level of education,

highlighting the need to tailor capacity building approaches to these demographics. Furthermore, a significant proportion of farmers are aware of climate change. However, this awareness does not significantly lead to the adoption of practices that reduce greenhouse gas emissions. This highlights the need for an inclusive approach to help smallholder farmers embrace both the awareness and actions necessary for this transition.

The findings provide insights into the current uptake of greenhouse gas reduction strategies among smallholder farmers and their barriers to adoption. This study contributes to the growing literature on greenhouse gas mitigation, such as low-carbon and carbon-neutral agriculture, by offering farmer-level evidence that can inform targeted policy interventions to help smallholder farmers decarbonise their farms, and potentially to gradually transition to carbon-neutral agriculture. This study is particularly relevant for Indonesia's national efforts to reduce greenhouse gas emissions from the agricultural sector to achieve Nationally Determined Contributions and other sustainable development goals. Furthermore, it may provide insights relevant to other developing countries with a significant presence of smallholder farmers who are striving to reduce agricultural emissions, particularly in the context of designing targeted policies that promote an inclusive transition to carbon-neutral agricultural practices.

Keywords: Decarbonisation, smallholder farmers, low-carbon agriculture

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Re-investigating the Age-income Relationship in China Agriculture: The Role of Mechanization Services in Mitigating Demographic Challenges

Aizhao Wang[1], Moyu Chen[2], Yu Sheng[3], Chao Peng[4]

[1]1 China Center for Agricultural Policy, School of Advanced Agricultural Sciences, Peking University, Beijing, China. [2]2 College of Urban and Environmental Sciences, Peking University, Beijing, China. [3]3 Crawford School of Public Policy, Australian National University, Canberra, Australia. [4]Ministry of Agriculture and Rural Affairs, Beijing, China

Keywords:

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

Paper Abstract:

Aging in the agricultural sector poses a key challenge for food security and growth in developing countries. This paper uses a nationwide longitudinal farm household survey from China to examine mechanization services' role in mitigating aging-related labor shortages, based on the Mincer function. We document an inverted U-shaped age-income profile, with peak earnings at 41.8 years — well below the sample average of 47.6 years — implying that demographic aging impairs labor efficiency. Incorporating age-mechanization interactions, we show that greater adoption, especially via services, narrows the marginal return gap between older (over 60 years) and younger farmers from 8.6 percent to insignificant levels. Two mechanisms drive this: (1) services lower machinery access barriers for smallholders, enabling substitution of labor-intensive tasks challenging for the elderly; and (2) they enhance older workers' efficiency,

enabling parity with youth. These findings highlight mechanization services as a vital technology for sustaining productivity amid aging workforces.

Farmers' Perceptions of Net-Zero Emissions and Sustainability Practices in Australian Agriculture

Pramod Gautam[1], Birgita Hansen[1], Nathan Robinson[1], Ramachandra Rao Kolluri[2], Harpinder Sandhu[1]

[1]Federation University, Ballarat, Australia. [2]IBM Consulting, Melbourne, Australia

Keywords:

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

26. Practice Change and Adoption

Paper Abstract:

Australian agriculture is facing growing pressure to contribute to national net-zero emissions targets while maintaining productivity and resilience. This study conducted a national survey to investigate farmers' perceptions of net-zero goals and their adoption of sustainable practices. The survey assessed awareness, perceived importance, motivations, adoption behaviours, and barriers to reducing greenhouse gas (GHG) emissions. Results (n = 192) indicate very high awareness of net-zero (93%) and widespread adoption of at least one sustainable practice (73%), with land-based measures such as soil health improvement, biodiversity plantings, and carbon sequestration being the most common. Exploratory factor analysis revealed two distinct motivational dimensions: intrinsic or benefit-driven factors (environmental concern, social responsibility, and economic benefits) and extrinsic pressures (regulation and consumer demand). Logistic regression analysis revealed that intrinsic motivations and knowledge, as well as market constraints, significantly predicted adoption, while the demographic and structural characteristics of farms played a limited role. These findings underscore the importance of value-based framing and enhanced access to practical, trusted information in accelerating agriculture's transition to net-zero. The study offers direct implications for policy design, extension services, and future research aimed at supporting technology driven climate-smart agriculture in Australia.

Keywords: climate policy, farmer perceptions, GHG reduction, net-zero emissions, sustainable agriculture

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Information Access and Perceived Technological Complementarity: Examining Rice Farmers' Paired Use of Biopesticides and Chemical Pesticides in Hubei province

Yuke Li[1,2,3,4], Xiaofeng Luo[1,2,3], Nazmun Ratna[4]

[1]College of Economics and management, Huazhong Agricultural University, Wuhan, China. [2]Hubei Rural Development Research Center, Huazhong Agricultural University, Wuhan, China.

[3]International Joint Laboratory of Climate Change Response and Sustainable Agriculture, Wuhan, China. [4]Faculty of Agribusiness and Commerce, Lincoln University, Lincoln, New Zealand

Keywords:

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

Paper Abstract:

With global warming the need for using pesticides has intensified with prolonged pest outbreaks. Although the substitution between biological and chemical pesticides is extensively researched, the Integrated Pest Management (IPM) remain relatively under examined to date, despite its multiple economic, ecological and environmental benefits due to broader spectrum of control, reduction of pest resistance and pesticide residues and cost effectiveness. Given the widespread application of IPM, defined as concurrent use of chemical and biological pesticides, this study employs survey data from 1,018 rice farmers in Hubei Province to investigate how pesticide recommendations influence farmers' decisions to adopt IPM. Employing Probit models, we find that a one-unit increase in pesticide recommendation levels is associated with an 11.64% increase in the likelihood of farmers' adoption. Mediation analysis indicates that perceived technical complementarity between biological and chemical pesticides effects the relationship between pesticide recommendations and farmers' integrated pesticide use. Further robustness checks confirms that higher recommendation levels strengthen farmers' perceptions of complementary effects, and thereby encouraged them to adopt IPM. In addition we evaluate the effect of farmers' age and plot size influence their adoption behavior. Farmers with fewer than 36 years of experience are more influenced by pesticide recommendations and perceived complementarity in pest control efficacy in contrast to farmers with longer experience, who are primarily motivated by perceived complementarity in ecological conservation benefits. Similarly, smallholder farmers are more responsive to recommendations and perceived complementarity in environmental protection, whereas those with larger plots (≥30 mu) are driven by perceived complementarity in pest and disease control efficacy only. Our findings provide insights for designing policy interventions by leveraging the influence of agricultural input dealers and extension agents to enhance farmers' awareness of the technical complementarity between biological and chemical pesticides, thereby contribute to sustainable rice production in China.

Improved communication between Regenerative and Modern Conventional Agriculture

Thomas Nordblom[1], Pradeep Rai[2], Sosheel Godfrey[1,2], Ryan H.L. Ip[3], Christine Storer[2], Karl Behrendt[4], Thomas Baumgartl[5], Richard Culas[1]

[1]Gulbali Institute, Agriculture-Water-Environment, Charles Sturt University, Wagga Wagga, NSW, Australia. [2]School of Agricultural, Environmental and Veterinary Sciences, Charles Sturt University, Wagga Wagga, NSW, Australia. [3]Department of Mathematical Sciences, Auckland University of Technology,, Auckland, New Zealand. [4]Harper Adams Business School, Harper

Adams University,, Edgmond, Shropshire TF10 8NB, United Kingdom. [5]Future Regions Research Centre, Federation University Australia, Churchill, Australia

Keywords:

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

Paper Abstract:

Literature Surveys across Regenerative and Modern Conventional agricultural approaches have been carried out: Kirkegaard et al. (2014), Bennett (2021), and Rai, et al. (2025). In some regenerative agriculture (**RA**) literature, conventional agriculture has been described as following unsustainable practices in line with the excesses of the early mechanised green revolution: deep ploughing, monocultures of new crop varieties boosted with chemical fertilizers and synthetic pesticides. In Australia, that form of careless agriculture is generally obsolete today and largely replaced by what we may call Modern Conventional Agriculture (**MCA**), characterised with awareness of soil conditions, soil chemistry, organic matter in the soil and on the soil surface, prevention of soil erosion by wind or rain with no-till operations and continuous maintenance of groundcover. There are wide overlaps with **RA** in crop rotations that include cereals, brassicas and leguminous cropping/pasture phases used widely to maintain soil fertility and limit the harm from pests (weeds, insects, and pathogens), integrated with informed safe application of biocontrol measures, fertilizers and plant protection chemicals.

In Rai et al. (2025), of 71 articles reviewed in detail, 46 explicitly discussed **RA**, and 25 addressed sustainability or holistic management relevant to **RA**. Key research gaps identified include: (1) Despite varying definitions and uncertain outcomes, growing interest in **RA** warrants further research into farmers' preferences for **RA** or **MCA**. (2) There has been insufficient evidence on how farmers balance the interconnected elements in the economic, social, and environmental domains for sustainable outcomes. (3) **RA** practices are often unclear and overlap with other production methods, necessitating clearer definitions of input systems and strategies used to comprehend **RA's** biophysical and economic outcomes.

In this decade, orthodox soil scientists dealing with land management and leaders in **RA** have been communicating and engaging effectively with each other. Examples in Australia include **Vic No Till** and **Regen WA**. The latter two have remarkable on-line outreach platforms offering farmers opportunities to connect with reliable subject-matter experts. *'A review of the economics of regenerative agriculture in Western Australia'* was compiled in 2021 by Anne Bennett. First among her findings was "There is no published work detailing the economics of regenerative agriculture in Western Australia." Importantly however, she has been instrumental in establishing **Regen WA**.

It is not uncommon to find **MCA** farmers borrowing what may have been RA practices such as retaining maximum ground covers, allowing reduced synthetic fertiliser and chemicals. With the rise of such **Vic** and **WA** groups, more RA farmers may take advantage of soil chemical tests to spot where essential micro-nutrients are most needed or when lime can most benefit acid pasture soils. There is room for better communication between RA and MCA advocates. Let's

explore ways of combining the best of both worlds, picking up the theme of Kirkegaard et al. (2014): “application of principles within specific farming systems is inevitably pragmatic due to the diverse biophysical and socioeconomic factors encountered.”

Note: this work supported by the Soils CRC and Gulbali Institute, Charles Sturt University

Parallel Session: Agricultural Innovation & Change

15:30 - 17:10 Thursday, 12th February, 2026

P Riverbank R8

Chair: Kodrad Winarno

Revisiting Agricultural Extension in the Philippines:A Systematic Review of Historical and Contemporary Models

Kathleen Mae Valencia, Risti Permani, Ammar Aziz

The University of Queensland, Brisbane, Australia

Keywords:

4. Agricultural Technology and Innovation

26. Practice Change and Adoption

Paper Abstract:

Agricultural extension in the Philippines remains a critical component of rural development and food security, serving as bridge between research institutions, government programs, and farming communities. Despite its central role, persistent gaps remain in how extension models respond to the country's agricultural development priorities, and remain relevant with contemporary trends such as digital transformation and pressures toward sustainability, and the lived realities of rural communities.

To address this knowledge gap, this study conducts a systematic literature review (SLR) to examine the evolution of extension models and programs in the Philippines from 1990 to 2024, with particular attention to how these frameworks have responded to the country's agricultural development priorities and sectoral trends, including digital transformation and sustainability demands. Guided by PRISMA methodology, the review draws from peer-reviewed and grey literature sourced from Scopus, Web of Science, regional repositories, and government archives. Studies were selected based on relevance to extension theory, communication strategies, and programmatic implementation in Philippine agricultural contexts.

This review employs thematic synthesis to examine conceptual transitions, policy orientations, and the integration of participatory approaches within agricultural extension practice. It begins by characterising the diverse extension models operating in the Philippines, including top-down, pluralistic, and participatory frameworks, each shaped by distinct institutional logics and historical trajectories. Next, the analysis identifies key drivers and barriers to the adoption of these models. Factors such as decentralisation, institutional fragmentation, evolving farmer needs, and resource constraints are shown to influence both the design and delivery of extension services. The third section explores the impacts of these extension models on digital adoption, sustainability outcomes, and alignment with national development priorities.

Finally, the review synthesises these insights into a conceptual framework that maps the relationships between extension model typologies, enabling conditions, and policy outcomes. This framework offers a grounded understanding of the Philippine extension landscape and informs future reform and strategic planning. By situating these findings within broader debates in agricultural innovation systems and development communication, the study contributes to participatory extension discourse in Southeast Asia and similarly situated contexts.

Nature-Based Innovation for Low-Emission Agriculture: Ex-Ante Assessment of BNI-Enabled Sorghum in Dryland Systems

Nedumaran Swamikannu[1], Dakshina Murthy Kadiyala[2]

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Keywords:

4. Agricultural Technology and Innovation

19. Impact Assessment

Paper Abstract:

Managing nitrogen sustainably remains a core challenge for modern agriculture. While chemical fertilizers boost yields, they also drive environmental degradation through nitrate leaching and nitrous oxide (N_2O) emissions. Biological Nitrification Inhibition (BNI)—a trait found in select crops such as sorghum—offers a nature-based solution. This study presents an integrated bio-economic modeling framework to assess the potential of BNI-enabled sorghum across dryland systems in South Asia and Sub-Saharan Africa. We employ the DSSAT crop systems model, customized to simulate BNI activity, to estimate biophysical outcomes, including yield, nitrogen flows, soil organic matter, and greenhouse gas emissions, under varying fertilizer regimes and climate scenarios. Results suggest that BNI-enabled sorghum can reduce nitrogen leaching and N_2O emissions while increasing the availability of plant-usable inorganic nitrogen. GHG emissions are reduced by up to 12%, without compromising productivity, especially under low-input conditions.

To evaluate the broader adoption potential and socio-economic trade-offs, we link DSSAT outputs to the TOA-MD (Tradeoff Analysis for Multi-Dimensional Impact Assessment) model. TOA-MD simulates heterogeneous farm populations and assesses the distribution of benefits, adoption likelihood, income changes, poverty reduction, and environmental impacts across representative farming systems. Our simulations demonstrate that BNI-enabled sorghum is particularly beneficial for resource-poor smallholders, as it improves nitrogen efficiency and reduces input costs, resulting in modest but measurable gains in farm profitability and resilience.

The integrated DSSAT–TOA-MD framework enables the *ex-ante* evaluation of BNI technologies across diverse agroecologies and socioeconomic settings. It supports evidence-based decision-

making for targeting breeding and dissemination efforts, identifying high-payoff geographies and farm typologies, and designing incentive mechanisms such as carbon credits or nitrogen-use efficiency subsidies. The study also explores scaling pathways through national breeding programs and private-sector partnerships.

By combining advanced crop modeling with economic impact assessment, this research provides actionable insights for breeders, policymakers, donors, and climate-smart agriculture initiatives. BNI represents a strategic innovation for sustainable intensification—enhancing productivity while mitigating environmental harm—thus contributing to national and global goals on emissions reduction, land degradation neutrality, and inclusive rural development.

Do Mechanization Stages Matter? Assessing the Impact of Agricultural Mechanization on Smallholder Farmers' Food Security in Indonesia

Hery Toiba, Moh Shadiqur Rahman

Universitas Brawijaya, Malang, Indonesia

Keywords:

4. Agricultural Technology and Innovation

19. Impact Assessment

26. Practice Change and Adoption

Paper Abstract:

Agricultural mechanization has long been regarded as a key driver of productivity growth and rural transformation. Yet, most existing studies treat mechanization as a uniform process, overlooking its heterogeneous effects across different stages of farming. This study addresses this gap by examining how mechanization at the Initial Stage, Maintaining Stage, and Harvesting & Post-Harvest Stage influences household food security among smallholder rice farmers. Using cross-sectional data from 420 rice-farming households in Indonesia, we apply a conditional mixed process model combined with inverse probability weighted regression adjustment (IPWRA) to estimate the causal impacts of mechanization adoption on food security outcomes, measured by the Food Consumption Score (FCS) and the Food Insecurity Experience Scale (FIES). The results demonstrate that mechanization during the Maintaining Stage exerts the strongest and most significant positive effect on food security, improving dietary diversity and reducing food insecurity. This is followed by mechanization at the Harvesting & Post-Harvest Stage, while mechanization at the Initial Stage shows relatively weaker effects. These findings imply that investments and policy interventions should not only expand access to mechanization services but also prioritize sustaining and scaling mechanization practices beyond land preparation. In particular, enhancing access to technologies and services for crop maintenance and harvesting is critical for improving household dietary quality and reducing food insecurity.

Smallholder farmers' welfare: the role of digital platforms in agricultural value chains

Sauda Afrin Anny[1,2], Ammar Abdul Aziz[1], Rajendra Adhikari[1]

[1]The University of Queensland, Brisbane, Australia. [2]Sher-e-Bangla Agricultural University, Dhaka, Bangladesh

Keywords:

4. Agricultural Technology and Innovation

19. Impact Assessment

Paper Abstract:

The application of cutting-edge technologies in agriculture has emerged as a global trend, aiming to enhance the lives of smallholder farmers. Digital platforms, encompassing online networks and applications that facilitate user interactions, are emerging as important tools for improving the efficiency of smallholders across agricultural value chain operations. The use of digital platform-based services in agricultural value chains is a recent phenomenon, particularly in developing nations. Despite numerous studies highlight the benefits of digital platforms in agriculture, the understanding of how these platform-based services enhance farmers' welfare in developing countries is still lacking. Therefore, this study investigates how smallholder farmers in a developing country like Bangladesh use digital platform-based services in their value chain activities and the subsequent effects on their welfare. The research used "iFarmer", a digital agricultural platform, as a case study and collected data from its users in three different regions of Bangladesh. Data collection involved three Focus Group Discussions (FGDs), one from each of the three districts, along with 29 in-depth interviews carried out across all three districts. The data were subjected to thematic analysis, yielding six major themes: financial security and inclusion; marketing and transaction costs; market access and product pricing; social networks and community relations; workload and time management; and knowledge and decision-making. The findings indicate that farmers primarily use iFarmer services, as they have significantly benefited from the convenience of accessing credit facilities from home, featuring lower interest rates and more flexible repayment options compared to traditional credit sources. Further, the use of digital platform-based services has facilitated farmers with new market opportunities and lower marketing costs by creating direct connections with buyers via digital platforms and their service representatives. Furthermore, the iFarmer app, along with service representatives, equipped farmers with relevant and timely information regarding farming practices, thereby enhancing their autonomy in making farm management decisions. However, farmers' engagement with the platform is frequently facilitated by the platform's local service representatives due to smallholders' limited access to smartphones or internet facilities and poor digital literacy. While this indirect involvement of farmers enhances their access and inclusion in platform-based services, it restricts their capacity to fully explore and utilise the comprehensive range of digital services available on the platforms. Therefore, this research offers significant insights into the use of digital platform-based services for enhancing farmers' welfare through financial inclusion, efficiency, and autonomy, while also highlighting the challenges that must be addressed to fully leverage the advantages of these services for farmers' welfare.

Rethinking Sustainable Agricultural Mechanisation in Indonesia's Rice Sector: An Integrated Systems Thinking and Network-Based Approach

Kodrad Winarno, Ammar Abdul Aziz, Risti Permani

The University of Queensland, Gatton, Australia

Keywords:

4. Agricultural Technology and Innovation

26. Practice Change and Adoption

Paper Abstract:

Despite ongoing government efforts to modernise agriculture, Indonesia's level of agricultural mechanisation (average of 0.44 Hp/Ha in 2021) remains the lowest compared to other countries, such as Japan (18.87 Hp/Ha), China (8.42 Hp/Ha), Thailand (4.2 Hp/Ha), and India (2.2 Hp/Ha), with regional disparities in adoption varies from 0.30 Hp/Ha to 8.80 Hp/Ha. These disparities pose a serious challenge to national food security, resulting in delays in reducing production costs & increasing productivity, which underscores the need for a more inclusive & context-sensitive transformation of agri-food systems. While public sector-led mechanisation initiatives in the Global South—including Indonesia—have often struggled with sustainability, the role of the private sector remains underexplored. Indonesia's vast archipelagic geography, coupled with diverse agroecological & socioeconomic conditions, necessitates region-specific strategies & a deeper understanding of the dynamic interactions among stakeholders.

Agricultural mechanisation is conceptualised as a system of interconnected human and non-human actors—including farmers, service providers, government agencies, mechanisation policy and regulations, financial institutions, training programs, and infrastructure—whose interactions influence the diffusion and sustainability of mechanisation. This study aims to reconceptualise sustainable agricultural mechanisation by examining the roles of both public and private actors and identifying leverage points for systemic change. It develops a novel integrated methodology combining Social Network Analysis (SNA) and Causal Loop Diagrams (CLD) from a systems thinking approach to investigate the complex dynamics shaping mechanisation adoption in Indonesia's rice sector. The study focuses on two contrasting rice-producing regions: East Java (high population density and fragmented smallholder farming) and South Sulawesi (lower population density and larger landholdings). Data were collected from November 2024 to January 2025 through 86 stakeholder interviews, five focus group discussions (one national and four regional) involving 31 key actors, and a review of institutional documents.

Preliminary findings suggest that the public sector sets the enabling conditions for mechanisation development (policy, infrastructure, coordination), as shown in the SNA as central nodes for the Ministry of Agriculture and regional governments. In the CLD, the government's policy feedback loops influence the system. Meanwhile, the private sector operationalises and sustains mechanisation through market responsiveness, service delivery and innovation. In the SNA, service providers play a central role in operationalising

mechanisation. Although peripheral to the SNA, machinery suppliers & financial institutions are essential for scaling up adoption. The CLD analysis also highlights key feedback loops & trade-offs between productivity, environmental sustainability, & equitable access to technology. By overlaying SNA data onto CLDs – a novel methodology introduced in this research - this study identifies potential leverage points for targeted interventions, such as strengthening farmer-researcher linkages, improving access to finance, and enhancing institutional coordination. These insights inform the development of context-specific impact pathways that support sustainable mechanisation strategies tailored to regional needs. This integrated approach offers valuable guidance for policymakers, researchers, and practitioners seeking to modernise agriculture in Indonesia. By recognising the dynamic interplay of socio-economic, biophysical, policy, and technological drivers, this study contributes to designing inclusive and resilient mechanisation pathways that align with Indonesia's broader goals of food security, rural development, and agricultural sustainability.

Program valid as at 6th February 2026

Social Networking

17:10 - 21:00 Thursday, 12th February, 2026

P Glenelg Surf Lifesaving Club and Moseley Beach Club

Buses leave for Glenelg at 5.15pm and 5.30pm sharp.

Social night starts 6pm onwards, at Moseley Beach Club and Glenelg Surf Lifesaving Club.

Bus 1 leaves to go home at 8pm, and Bus 2 at 9pm.

Friday 13th February

Parallel Session: Grains & Crops

08:30 - 09:50 Friday, 13th February, 2026

P Riverbank R2

Chair: Dilini Perera

Stability of Wheat Supply Chains Amid Deregulation: Identifying Policy Options for Enhancing Food Security in Pakistan

Sosheel Godfrey[1,2], Ryan H.L. Ip[3], Thomas Nordblom[1], Azubah Azim[4]

[1]Gulbali Institute, Agriculture-Water-Environment, Charles Sturt University, Wagga Wagga, Australia. [2]School of Agricultural, Environmental and Veterinary Sciences, Charles Sturt University, Wagga Wagga, Australia. [3]Department of Mathematical Sciences, Auckland University of Technology, Auckland, New Zealand. [4]Price Control and Commodities Management Department, Government of Punjab, Lahore, Pakistan

Keywords:

23. Market Design and Policy

25. Policy Analysis

Paper Abstract:

Pakistan faces a significant challenge in maintaining the stability of its wheat supply and prices, which are vital for food security. The country is navigating a policy vacuum caused by the recent removal of two historic farm-level policies: the Minimum Support Price (MSP) and government wheat procurement, both of which ensured adequate local wheat production.

Although Pakistan contributes 4% to global wheat production (29 million Metric Tons for the fiscal year 2024/2025), 79% of farms are smaller than 5 acres. Wheat is the staple food for the nation, accounting for a substantial 72% of daily caloric intake. With per capita consumption around 124 kg annually, Pakistan ranks among the highest in global wheat consumption.

In light of this policy change, this study examines policy options that can be implemented to ensure a stable wheat supply and price with minimal market interventions, while effectively safeguarding food security.

To guide policy development, the paper draws on a comparative framework from the Australian wheat industry's deregulation in 2008, which ended the Australian Wheat Board's (AWB) single-desk export monopoly. While this reform promoted competition and efficiency, it also resulted in increased price volatility for growers. Australian farm gate prices are market-driven, based on international prices adjusted for logistics and quality. Over the years,

Australian wheat farm sizes have also increased significantly due to farm consolidation, with fewer, larger farms replacing numerous smaller ones. Notably, the Australian model has evolved to more on-farm storage, with a capacity to store over 70% of an average harvest on the farm, each with an approximate capacity of 3,200 tonnes.

For Pakistan, which has small-sized farms, the key policy suggestions focus on establishing strategic wheat reserves to support food security and stabilise prices, while empowering smallholders. This study aims to develop a resilient Public Food Stockholding (PSH) system, incorporating an early warning mechanism to effectively manage reserves. This system would set a domestic price threshold, triggering the withdrawal or replenishment of reserves. The proposed model will operate within a price band, where the government buys wheat when prices are low to reduce market supply and sells it when prices are high, thereby increasing supply and pushing prices back down. It does so around two target prices (a high and a low), allowing the market to move but only between the target price band.

The price band determination and warning indicator will be based on IFPRI's Excessive Food Price Volatility Early Warning System, using Conditional Value at Risk (CVaR), which focuses on the tail end of the distribution and requires enhanced market intelligence.

Additionally, the research aims to identify the optimal levels and locations for strategic wheat reserves along the national supply chain, as well as assess the vulnerability of such policies. The research could benefit millions of poor household consumers and producers in Pakistan.

Enhancing Biodiveristy and Valuing Natural Capital in the grain industry in Australia

Shima Madani, Valerie Seidel, Edwin Chihava, David Osorio

Balmoral Group Australia, Sydney, Australia

Keywords:

5. Biodiversity

15. Farm Management and Farmer Behaviour

18. Grains and Cropping Systems

27. Productivity and Efficiency

Paper Abstract:

The Australian grains industry is entering a period of rapid transformation, where biodiversity enhancement and natural capital valuation are becoming integral to market access, risk management, and long-term resilience. To support this, Balmoral Group Australia (BGA), on behalf of the Grains Research and Development Corporation (GRDC), conducted a multi-stage investigation that combined a literature review, tool assessment, and direct engagement with industry stakeholders to understand awareness, appetite and capacity to improve natural capital.

The study conducted in-person interviews with 26 grain growers across five agricultural regions and 15 global supply chain and industry stakeholders. Findings revealed that while 69% of

growers had some awareness of ESG, TNFD, or natural capital accounting, knowledge was uneven, and only one respondent could clearly define all three. Despite limited familiarity, 58% of growers had already been asked to provide environmental data (primarily ISCC-related), and 88% expect reporting requirements to escalate within five years. Stakeholders, by contrast, demonstrated a broader awareness but highlighted the lack of consistent biodiversity and natural capital standards. Stakeholders reported using a variety of measures, which varied in alignment with on-farm data. Specific opportunities for alignment of national and global standards were identified, with key differences in the use of satellite data found.

Analysis of current tools (financial/accounting platforms, Ag tech systems, geospatial monitoring) indicated that none are yet fully fit-for-purpose for on-farm biodiversity reporting. However, evidence from case studies demonstrates that biodiversity enhancements and natural capital practices can deliver substantial potential value in terms of EBIT.

The study identified both barriers — fragmented data expectations, inconsistent terminology, and high compliance costs — and opportunities, including centralised data hubs, simplified reporting standards, and incentive models linking finance, compliance, and market access. Strategic action is required to convene cross-sector dialogues, promote environmental credibility standards, and embed biodiversity metrics into long-term planning frameworks.

By combining empirical survey data with quantitative analysis, this work demonstrated how growers and supply chains can jointly position biodiversity and natural capital as drivers of resilience, productivity, and global competitiveness. The presentation will share findings from the work, including misalignment between global standards and data collection by grain growers, opportunities to streamline reporting and monitoring, and industry-wide prospects for improved productivity through improved natural capital.

Optimising Wheat Class Distribution: Meeting Quality Demands in Southeast Asian Markets

Hemali Kanthilanka, Chris Carter

Australian Export Grains Innovation Centre (AEGIC), Perth, Australia

Keywords:

18. Grains and Cropping Systems

20. International Trade

Paper Abstract:

In the global wheat trade, aligning with end-user quality requirements is essential for sustaining long-term market relationships. Yet, systematic evaluations of wheat suitability for specific markets remain underdeveloped in the grain industry. This study addresses this gap by examining the fit of major Australian, Canadian, and US wheat classes in key Southeast Asian markets, including Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. The analysis focuses on demand preferences and end-product quality alignment. We assess the capacity of Australian wheat to meet the quality requirements of major end-use products relative to competitor classes. A weighted scoring system combined with linear programming optimisation

is used to identify optimal allocations of wheat classes that enhance both market fit and economic value, while accounting for Australian supply and demand constraints specific to each market. Initial allocation weights are based on market share, suitability scores, and price premiums. Suitability scores, ranging from 0 to 1, quantify how well each wheat class matches the product-specific requirements of target markets. Optimisation is then applied to incorporate supply and demand limitations, ensuring allocations balance technical, economic, and market considerations. Preliminary results indicate that Australian wheat exhibits strong competitiveness in noodles, cakes, and cookies, but faces challenges in bread products, where Canadian wheats often achieve higher suitability, as reflected in the allocations. Nonetheless, optimisation suggests that Australian classes can capture greater value when strategically allocated across end-use segments in markets, rather than being distributed uniformly. Across all five markets, the model highlights opportunities for improving alignment with demand through targeted allocation strategies, resulting in higher economic returns. Furthermore, effective market education emerges as a key strategy for maintaining and strengthening Australia's position in these critical markets.

Analysing Challenges in High Value Agriculture Using Systems Thinking: A Case Study of Sri Lankan Mango Farm Gate

Dilini Perera[1,2], Sangeeth Fernando[1], Anupa Dissanayake[1], Raveena Udari[1], Jeewika Weerahewa[3]

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Keywords:

1. Agribusiness

18. Grains and Cropping Systems

Paper Abstract:

High-value agriculture (HVA) is a promising pathway for rural transformation in developing countries, though smallholder inclusion remains a challenge. This study analyzed the Sri Lankan mango value chain to identify structural barriers that hinder smallholder participation in HVA. Using a systems thinking approach, the research identifies dynamic feedback loops, coordination failures, and market inefficiencies. Primary data was collected from March to September 2024 through surveys of farmers (548), in-depth interviews with collectors (15), and focus group discussions with stakeholders (Agriculture Development officers (25), Mango exporters and processors (4), rural financial institutions (2). Causal Loop Diagrams were developed to articulate system-wide problems and formulate a dynamic hypothesis for policy-oriented intervention design.

The Systems thinking approach revealed reinforcing feedback loops that perpetuate inefficiencies, food loss, and income instability. Seasonal production cycles, information asymmetries, and environmental shocks further exacerbate supply-demand mismatches and poor-quality outcomes. Market failures stem from weak governance, opportunistic intermediaries, and fragmented stakeholder relationships. Farmers often lack incentives to

invest in quality due to low returns and unpredictable pricing. Stakeholders identified key leverage points for intervention, including improved access to credit and training, the development of real-time market information systems, support for low-cost mango processing facilities, and the strengthening of farmer organizations. These systemic interventions aim to enhance coordination, reduce post-harvest losses, and create a more inclusive, resilient, and profitable high-value agriculture sector.

Parallel Session: Climate Change & Fire

08:30 - 09:50 Friday, 13th February, 2026

P Riverbank R3

Chair: Emma Sinclair

Fire Regimes in Transition: A Spatiotemporal Analysis of Historical and Projected Fire Activity in Victoria

Sonia Akter[1], Manh Tien Bui[1], Erica Marshall[2], Amy Smith[2]

[1]Crawford School of Public Policy, College of Law, Governance and Policy, the Australian National University, ACTON, ACT, Australia. [2]School of Agriculture, Food and Ecosystem Sciences, the University of Melbourne, Melbourne, VIC, Australia

Keywords:

8. Climate Change

21. Land and Natural Resource Management

Paper Abstract:

Climate change is intensifying fire risk, underscoring the need to understand how fire regimes evolve and how a warming climate will reshape them. This study presents the first statewide, fine-scale assessment of Victoria's fire regimes from 1960 to 2098, integrating six decades of observed wildfire records with high-resolution, climate-driven projections across the Central Highlands, Gippsland, Grampians, Mallee, and Otways at the Statistical Area Level 1 (SA1) scale. Historical wildfire data from 1960 to 2024 are combined with climate and socioeconomic simulations for 2025 to 2098 under scenarios with and without fire management, using temporal trend analysis and spatial econometric techniques to track changes in wildfire frequency, spatial extent, persistence and return intervals. Without management, wildfire annual area , frequency, and spatial rate of spread increase sharply under predicted climate, with nearly two-thirds of SA1 units that were historically unaffected projected to burn at least once. Fires exhibit strong persistence and spatial clustering linked to ecological connectivity, while regional trajectories differ: the Central Highlands, Grampians, and Otways show steady increases in wildfire activity, Gippsland displays marked interannual variability, and the Mallee remains comparatively stable. Statewide fire return intervals indicate moderate fire seasons recur on average every 2.5 years and extreme events once a decade. With current fire management, these trends persist but are substantially reduced, characterised by longer return intervals, reduced wildfire extent, and weaker spatial clustering. By quantifying shifts in wildfire frequency, spatial extent, persistence and return intervals across five regions, this analysis moves beyond the hazard indices and coarse bioregional assessments that dominate Australian fire research. The findings demonstrate that ongoing climate change will transform historically moderate and spatially contained fire patterns into wildfire regimes that are more frequent,

extensive and clustered, establishing a new empirical foundation for ecological restoration, land-use planning and climate-adaptation strategies.

The Effect of Extreme Wildfire Exposure on Energy Poverty: Evidence from Australia's Black Saturday Bushfires

Yitian Wang, Russell Smyth

Monash University, Melbourne, Australia

Keywords:

8. Climate Change

14. Environmental Economics

Paper Abstract:

Climate change increases instances of extreme weather events, contributing to the frequency and intensity of natural disasters. Wildfires are one of the main consequences of global warming and extreme weather events. Over the past two decades, extreme wildfire events worldwide have shown a strong upward trend, with the frequency and intensity of fires more than doubling. Increasingly frequent extreme wildfires have become a significant environmental and social challenge in many parts of the world. One potential consequence of extreme wildfires that has received limited attention is their contribution to household energy stress and the underlying mechanisms. In high-income countries with universal access to modern energy services, energy poverty is generally understood as arising at the intersection of low income and unreasonable energy expenditures, and it serves as a good proxy for household energy stress. Assessing how exposure to extreme wildfires affects the likelihood of households experiencing energy poverty provides important insights into the micro-level impacts of such events.

This study assesses the causal effects of the 2009 Black Saturday Bushfires (BSB), which was the deadliest bushfire in Australia's history, on household energy poverty. Using a linear panel event-study design, applied to matched longitudinal household and geographical data, our results suggest a significant increase in the likelihood of experiencing energy poverty among households residing within 15 kilometers of wildfire areas. Specifically, we find that for households directly affected by the fires, the likelihood of being in energy poverty increases by 10.45-12.23 percentage points in 2010, and by 12.30-13.62 percentage points in 2011, compared to 2005-2007, which is the reference period. These results are robust to a number of sensitivity checks. Examining the effect of BSB exposure on income poverty and other welfare indicators suggests that the result for energy poverty is not merely a proxy for broader welfare impacts.

We find that personal wellbeing and community social support are important mechanisms. Additionally, having a higher level of openness to experience and adopting longer-term financial planning mitigates the effects of BSB exposure on energy poverty. The factors that attenuate the effect of the BSB on energy poverty have important policy implications. Investing

in targeted programmes can encourage households toward higher levels of openness to experience, thus enhancing their resilience after disasters. Our results also highlight the value of investing in financial literacy training programs. Enhanced financial literacy can foster long-term financial planning habits, thereby increasing financial resilience.

Economic Impacts of Bushfires and Land Zoning: Evidence from Australian Firms

Prasad Bhattacharya, Ameeta Jain, Nabeel Maqsood, Hemant Pullabhotla

Deakin University, Melbourne, Australia

Keywords:

14. Environmental Economics

21. Land and Natural Resource Management

Paper Abstract:

Globally, disasters such as fires and floods threaten the economy, including in Australia, and risks are expected to increase with climate change (Australian Government, 2022). Damages may increase to nearly $73 billion annually by 2060 (Deloitte, 2021). While some damages are temporary, disasters can cause long-lasting effects, especially business closures, with small and family-run businesses being particularly vulnerable (Australian Small Business and Family Enterprise Ombudsman, 2022). Understanding which businesses are at risk and measuring the impact of disasters on closures are vital for crafting policies and disaster preparedness. The role of preparedness measures, such as high-risk land zoning, in mitigating impacts remains to be quantified.

In this study, we examine the effect of bushfires—a particularly significant source of disaster risk across much of Australia—on business survival. Bushfires can harm businesses through direct fire damage, as well as through immediate disruptions such as supply chain issues and demand-side effects, including decreased tourism or a consumer exodus. Fires can also have long-term impacts by affecting health and labour productivity, ultimately increasing the likelihood of business closures. Conversely, recovery and rebuilding efforts could stimulate business activity by encouraging both public and private investment.

We estimate the net impact on firm activity across Australia using twenty years of data from the census of all business enterprises, covering all sectors and providing high spatial resolution nationwide. We link firm counts at the local community level (Statistical Area 2, or SA2 level; nearly 2,500 SA2s nationwide) with detailed data on bushfire incidents from administrative and satellite sources. Using this SA2 by year panel from 2003 to 2024, our preferred model controlling for SA2, year, and state-by-year fixed effects indicates that communities affected by fires experience a significant decline in business activity. Specifically, SA2s that experience a bushfire see an average reduction of about 10 firms in the following year—a 15 per cent decrease relative to the sample mean. The impact grows with the severity of the bushfire, measured as the proportion of SA2 area burned annually. The risk of business closure is notably

higher among small businesses, including sole proprietorships and firms with fewer than 20 employees.

We then utilise detailed annual land zoning data on the boundaries marking bushfire-prone areas (BPAs) in two states to assess whether hazard land zoning can mitigate negative impacts on firm activity. While the BPA designation enhances fire safety measures, it also incurs additional costs for businesses required to meet more stringent regulatory and safety standards. Moreover, BPA designation can influence local economies by affecting housing markets, which subsequently alters demand. Our spatial difference-in-difference analysis compares communities affected by bushfires within BPA zones to those in adjoining non-BPA zones, accounting for pre-existing differences. Our findings suggest that land zoning offers limited mitigation for firm activity outcomes, implying that land use policies alone are insufficient and should be complemented by other disaster-preparedness strategies to better safeguard economic stability.

"A Seat at the Table": Indigenous Adaptation, Governance Barriers, and Caring for Country after the Black Summer Fires

Emma Sinclair[1], Sonia Akter[2], Quentin Grafton[2]

[1]ANU, Sydney, Australia. [2]ANU, Canberra, Australia

Keywords:

8. Climate Change

28. Uncertainty and Risk

Paper Abstract:

This paper examines Indigenous adaptation in practice through a case study with a Local Aboriginal Land Council in the wake of the 2019–2020 Black Summer bushfires. Drawing on yarning circles, in-depth interviews, and policy/document review, we trace how the community navigates preparedness (immediate readiness) and adaptation (longer-term social, cultural, and institutional change). We mobilise a rupture lens (Mahanty et al 2023) to read fires not only as extreme events but as moments that expose enduring structural precarity under settler colonial governance. Findings show strong social cohesion and a deeply rooted ethics of Care for Country and Community - expressed through supportive communication during and after the emergency; a direct responsibility for protecting Elders and the broader community; a commitment to Care for Country, such as delaying recreational access (e.g., mountain bike trails) until the land recovers and protection of cultural sites and species; and proactive efforts like seeking funding to better prepare for future fire events. Yet these strengths are routinely constrained by: (1) institutional exclusion—uncertain, ad-hoc invitations to decision forums ("a seat at the table" is not guaranteed), limited roles in command and planning centres; (2) procedural and resource barriers—funding hurdles, credibility/legibility tests for Indigenous organisations, and thin resourcing for consultation; (3) epistemic misalignment—risk framings that privilege property over Country, metrics that miss cultural, relational, and embodied impacts, and a lack of culturally safe counselling and

recovery supports. These dynamics reproduce what Indigenous scholars describe as slow/secondary disasters, where colonial structures continue to suppress Indigenous governance. We argue that transformative adaptation requires moving beyond household preparedness checklists to embed Indigenous authority in the governance of fire: formal decision-making roles for LALCs; resourced, ongoing community liaison; integration of cultural burning; locally controlled healing infrastructures; and evaluation frameworks that measure cultural and relational recovery alongside economic indicators. By centering Indigenous governance and ethics of care, adaptation can shift from "adapting to risk" toward reconfiguring the conditions that produce vulnerability—on terms defined with, and led by, Traditional Owners.

Keywords: Indigenous adaptation, Local Aboriginal Land Councils, disaster governance, disaster management, cultural burning, rupture, bushfire preparedness, Black Summer, Caring for Country, transformative adaptation.

Parallel Session: Climate & Water

08:30 - 09:50 Friday, 13th February, 2026

P Riverbank R4

Chair: Siqi Huang

Provincial analysis of smallholder farmers' perceptions and responses to climate variability in Sri Lanka

B K D Jagath Rohan Samarasinghe[1], Zhu Yuchun[1], N Rupika Abeynayake[2], R W W M P Kanishka Wanninayake[3]

[1]Northwest A & F University, Yangling, China. [2]Manchester Metropolitan University, Manchester, United Kingdom. [3]Ministry of Agriculture, Galewela, Sri Lanka

Keywords:

3. Agricultural Production

8. Climate Change

Paper Abstract:

Purpose – This study examines smallholder farmers' perceptions of climate variability and their adaptation strategies across three agriculturally significant provinces in Sri Lanka, North Central, Eastern, and North Western, addressing the existing gap in region- and crop-specific research on climate adaptation.

Design/methodology/approach – A mixed-methods approach was employed, using data collected from 656 smallholder farmers through semi-structured questionnaires. The study examined perceived climate variations, adaptive strategies, and socioeconomic factors influencing adaptation. Logistic regression analysis was used to identify determinants of adaptation decisions.

Findings – Farmers reported significant changes in climate patterns, including increasing temperatures, delays in rainfall, intense rainfall, decreasing number of rainy days, and changing rainfall patterns. Considerable variations in farmers' perceptions of climate variations across provinces were observed. Six major adaptation strategies were identified: crop rotation, application of organic matter, irrigation management, farm insurance, changing planting times, and crop varieties. The considerable influence of gender, farm experience, household size, farmland area, family labour, education, and owning livestock on adaptation practices was revealed. Access to climate information was revealed as the most influential factor for several adaptation practices. Regional variations were observed, with farmers in the Eastern province more likely to adopt multiple strategies compared to farmers in the North Central province.

Originality/value – This study provides evidence-based insights for designing targeted adaptation policies in Sri Lanka, emphasizing the importance of localized strategies, gender

considerations, and improved climate information dissemination to enhance smallholder resilience to climate variability.

Household Tap Water Access and Social Inequality under India's Jal Jeevan Mission

Sonia Akter[1], Linh Bui[1], Vijayalaxmi Khed[2]

[1]Crawford School of Public Policy, Canberra, Australia. [2]Independent Researcher, Telangana, India

Keywords:

25. Policy Analysis

31. Water

Paper Abstract:

India's Jal Jeevan Mission (JJM), launched in 2019, aims to provide every rural household with a functional tap connection by 2024 (later extended to 2028) and a minimum of 55 litres of safe drinking water per person per day. The program prioritises districts with poor water quality or chronic water scarcity, and national coverage of household connections rose from about 20 per cent in 2018 to nearly 80 per cent by 2023. However, there is limited evidence on the program's implementation and the distribution of its benefits. Although tap connections are provided free of cost, actual implementation is shaped by the socio-economic development of regions. Often, large-scale infrastructure investments reinforce socio-economic hierarchies, and implementation rarely follows mandated criteria. The present study uses three different data sources: official JJM's rollout dashboard (2018–2023), the Periodic Labour Force data (2018–2023) for district socioeconomic characteristics and historical water-quality and quantity estimates from the Aquaya India District-Level Water Quality and Scarcity dataset (1999 – 2020), to assess whether access to tap water expanded equitably across caste, class, and water-stress indicators. After the JJM launch, southern districts with socio-economically non-marginalised populations recorded the highest gains, while districts with higher shares of marginalised lagged behind, indicating disproportionate benefits for socio-economically advantaged groups. Need-based targeting produced mixed outcomes: districts with historically contaminated water, including high nitrate levels from agricultural runoff, high chloride levels from salinity or seawater intrusion, and high electrical conductivity reflecting excessive dissolved minerals, received more connections. However, water-scarce districts, defined by low rainfall and limited surface or groundwater availability, were not systematically prioritised. Overall, JJM improved access in areas with contaminated sources but made limited progress toward inclusivity and did little to reduce entrenched social inequalities, particularly in North India. To strengthen equity and effectiveness, future work of JJM should incorporate caste-sensitive targeting and prioritise water-scarce districts through transparent, data-driven allocation frameworks. Addressing these gaps is essential to ensure that infrastructure investments do not perpetuate existing socio-economic hierarchies.

Climate change and water conservation practices in North China

Siqi Huang[1], Di Zeng[1], Alec Zuo[2], Jinxia Wang[3]

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Keywords:

4. Agricultural Technology and Innovation

8. Climate Change

Paper Abstract:

Climate change has intensified water scarcity, threatening sustainable agricultural development globally. In North China, a region critical to national food security yet facing severe water shortages, adoption of water conservation practices (WCPs) remains limited. This study examines how key climate variables influence household-level adoption of five common WCPs across Henan, Hebei, and Ningxia provinces from 2001 to 2015. Using random-effects, correlated-random-effects, and population-average probit models, we account for unobserved heterogeneity and within-farmer correlation. Results show that short-term precipitation variability consistently deters WCP adoption, while long-term rainfall decline reduces use of basin irrigation, mulch, and intermittent systems. Temperature effects are more complex: short-term variability encourages flexible, low-cost methods (furrow irrigation and surface pipelines), whereas sustained warming promotes adoption of underground pipelines and intermittent irrigation. Regional disparities are pronounced, shaped by water source dependence and infrastructure. Findings highlight the need for climate-responsive and regional-specific policies to foster adaptive irrigation strategies in North China.

Parallel Session: Agricultural Production

08:30 - 09:50 Friday, 13th February, 2026

P Riverbank R5

Chair: Muhammad Watto

Transforming Farm Investment Decisions: Smartphones and Mechanisation Services in Potato Cultivation

Lixue Qu, Wanglin Ma

Lincoln University, Christchurch, New Zealand

Keywords:

1. Agribusiness

4. Agricultural Technology and Innovation

Paper Abstract:

Abstract

The spread of smartphones has transformed information access in rural economies, but little is known about their effect on mechanisation demand among smallholders. This study examines the impact of smartphone use on mechanisation service expenditure among potato farmers in India, using survey data from 793 households. We apply a two-stage residual inclusion method to account for the endogeneity issue of the smartphone use variable. The results show that smartphone use significantly increases mechanisation service expenditure. On average, households with smartphones spend about 3,182 INR more per acre on machinery rental and custom-hiring services, after controlling for household, farm, and regional characteristics. Heterogeneity analysis reveals striking differences by household labour availability. Among labour-constrained households, smartphones substitute for missing family labour and raise mechanisation service expenditure by about 16,441 INR per acre. By contrast, smartphones reduce expenditure among labour-abundant households by around 7,688 INR per acre, suggesting that access to digital information enables these households to optimise production schedules and cut costs. These findings indicate that smartphones reduce transaction costs, improve coordination with service providers, and encourage greater reliance on mechanisation in potato cultivation. This study provides solid evidence of how digital technology affects farm investment decisions, highlighting the role of peer-based social learning in use, and demonstrating that effects vary with labour endowments. The results carry clear policy implications: expanding rural mobile access can promote mechanisation for labour-scarce households. At the same time, complementary measures are needed for labour-abundant households to ensure smartphones foster efficiency without reducing employment.

Keywords : Smartphone use; Mechanisation service expenditure; Potato production; 2SRI Model; Labor endowment, India

Behavioural Insights into the uptake of Integrated Pest Management (IPM) in Australian Horticulture: Evidence from the Northern Rivers

Abebayehu Geffersa[1], Hazel Parry[2], Andrew McGregor[3], Nicholas Harrigan[3], Hangyoung Lee[3], Sunita Chaudhary[3], Kirt Hainzer[3]

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Keywords:

15. Farm Management and Farmer Behaviour

26. Practice Change and Adoption

Paper Abstract:

Protecting crops from pests and pathogens is essential for global food security. Although an array of effective chemical-based pest control remains widely used, a range of interrelated trends are predicting a future where the availability, efficacy and access to agrichemicals will be reduced. While Integrated Pest Management (IPM) incorporates a range of control measures in pest management, consequently reducing the use of chemical control measures, uptake remains limited. External constraints—such as market access, limited information on the range of practices available, and weather shocks—have been cited as barriers to IPM adoption, primarily in studies from developing countries. Beyond these external constraints, behavioural and psychological factors, including risk perceptions, loss aversion, perceived complexity, and environmental stewardship values, are now recognised as critical influences on farmers' decisions. However, these factors remain largely underexplored in the context of IPM adoption, particularly in relation to how they interact with agroecological and environmental conditions in a developed country like Australia. In this study, we address this gap through two complementary approaches. First, we develop a conceptual framework that outlines the economic and environmental benefits of IPM adoption in horticultural systems. This framework incorporates both direct benefits and indirect (non-market) values, with particular focus on behavioural drivers and constraints. Second, we present new empirical evidence from a survey of horticultural growers in the Northern Rivers region of New South Wales (*Bundjalung Country*). The survey captures pesticide use, IPM uptake, and a range of socioeconomic and psychological factors—including risk attitudes, perceptions of complexity, and environmental values. Drawing on behavioural economics and econometric analysis, we present preliminary findings highlighting key behavioural patterns that influence IPM adoption in the Australian horticultural context.

Keywords: Sustainable management, Pesticide use, Farmer behaviour, Risk perception, IPM adoption

House matters: Impact of facility and farming environment on rearing performance in the egg industry

Shang-Ho Yang[1], Chen-Yuan Liao[2]

[1]National Chung Hsing University, Taichung City, Taiwan. [2]Agricultural Technology Research Institute, Hsinchu City, Taiwan

Keywords:

8. Climate Change

15. Farm Management and Farmer Behaviour

28. Uncertainty and Risk

Paper Abstract:

Eggs are a vital food source, and their stable production is essential for national nutrition and food security. With climate change causing variability in environmental conditions, the egg industry faces uncertainties in production efficiency and rearing performance. Investigating how farmers' management decisions and facility equipment affect rearing rates can help enhance industry resilience and long-term economic benefits.

This study utilizes 332 valid sample data completed by Taiwanese egg farmers, covering various aspects, including poultry house types, operational scale, equipment types, and management practices. Rearing performance indicators—mortality rate, egg production rate, and economic loss—serve as the primary outcome measures. Analysis employs one-way ANOVA and interval regression models to examine how management decisions and equipment conditions influence these indicators.

Preliminary results indicate that farms with well-controlled internal environments exhibit significantly lower mortality rates and higher egg production, underscoring the positive correlation between rearing conditions and productivity. Regarding farming facilities, farms that use water nipple drinking systems outperform those with traditional watering devices in terms of egg-laying rates and economic benefit. Additionally, having sun-shaded water tanks significantly reduces mortality efficiency. Moreover, farmers with poorer mortality and production outcomes express a stronger intention to upgrade farming facilities and equipment, indicating a propensity to invest capital for performance improvements. Conventional battery cage layer farms perform worse than cage-free layer farms in terms of mortality rate, egg production rate, and economic losses. This indicates that, in order to cope with increasingly unpredictable climate change, Taiwan’s egg producers should continue to improve their poultry houses’ ability to withstand climate challenges. The results of this study found that enriched cage layer houses achieved the best egg production rate and output scale among all types of layer housing systems. However, the performance of enriched cage houses still depends on farmers’ management practices, and improper management may lead to a higher risk of mortality.

In conclusion, modernizing poultry house facilities and maintaining suitable internal environments play a critical role in improving rearing rates and egg production efficiency. Such

improvements also contribute to reducing unit production costs and strengthening industry competitiveness. Policy recommendations include enhancing access to precise production information, promoting equipment upgrade subsidies, and reinforcing risk management capacities among egg farmers, thereby supporting sustainable economic development and supply security in Taiwan's egg industry.

Legume adoption and fertiliser cost savings in Australian mixed-farming systems: Evidence from panel data (1990–2022)

Muhammad Watto[1], Muhammad Azeem[2], Jonathan Richetti[3], Marta Monjardino[2]

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Keywords:

3. Agricultural Production

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

Paper Abstract:

Fertiliser use has been a significant contributor to agricultural productivity in Australia; however, its heavy reliance has raised concerns about both cost and sustainability. Fertiliser costs constitute one of the largest farm operating expenses, and recent price volatility has renewed interest in legumes as a biological source of nitrogen (N). Legumes fix atmospheric N and can help partially substitute for fertiliser inputs, yet their effect on actual farm expenditure has rarely been quantified beyond plot or farm-level trials. This study uses panel data from seven Australian mixed-farming regions between 1990 and 2022 to estimate the impact of legume adoption on fertiliser expenditures. We employ a fixed-effects regression model with year dummies to capture the temporal effects of legume adoption on fertiliser costs and region-clustered standard errors to control for unobserved spatial heterogeneity. As expected, the results show no significant impacts on fertiliser costs in the establishment year, instead a slight increase, which reflects that establishment requires nutrients for nodulation. In the subsequent years, fertiliser expenditure declines by around 1.1% in Year 1 and 1.5% in Year 2 for every percentage-point increase in legume share, within the observed adoption range (up to about 50% of cropped area). By year 3, fertiliser costs rebound as N benefits decline. The study findings confirm agronomic evidence on biological N fixation that legumes reduce fertiliser costs in the short to medium term. This evidence highlights the role of legumes in buffering farms against fertiliser price volatility while supporting environmentally sustainable production.

Parallel Session: Development & Finance

08:30 - 09:50 Friday, 13th February, 2026

P Riverbank R6

Chair: Di Zeng

Financial Institution Development and Agricultural Credit in Developing Economies: The Moderating Role of National Governance Quality

Rishab Bisht, Dr.Inder Sekhar Yadav

Indian Institute of Technology, Kharagpur, Kharagpur, India

Keywords:

1. Agribusiness

2. Agricultural Finance

Paper Abstract:

The provision of agricultural credit remains a critical driver of productivity and rural development in emerging economies. Financial institution development measured in depth, access, and efficiency is expected to reduce information asymmetries, enforcement barriers, and transaction costs, thereby enhancing the supply of credit to the agricultural sector. Against this backdrop, the present study investigates the impact of financial institution development on agricultural credit across 40 developing countries in 2005–2021, particularly emphasizing the moderating role of national governance quality in the relationship between financial institution development and agricultural credit. Agricultural credit is measured as institutional lending to producers in agriculture and allied activities, while financial institution development is captured through the IMF's composite financial institutions development index. To account for governance, the study employs the six dimensions of the Worldwide Governance Indicators, namely voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption, reflecting aspects such as contract enforcement, judicial effectiveness, and creditor protection. In addition, relevant control variables are incorporated, including the dependency ratio, inflation, mobile subscriptions, and precipitation, with data drawn from the Food and Agriculture Organization and AidData. Using several panel data estimation techniques, including fixed and random effects models, the study establishes a robust positive relationship between financial institution development and agricultural credit. Moreover, governance quality significantly reinforces this relationship by reducing uncertainty, lowering transaction costs, and addressing institutional inefficiencies while improving the effectiveness of financial intermediation. Overall, the findings underscore the critical importance of strengthening financial institutions with broader governance reforms to ensure inclusive and sustainable access to farm credit in developing economies.

Financial Feasibility and Socio-Economic Impacts of Agri-FinTech Lending for Smallholder Farmers in Indonesia: A Social Cost-Benefit Analysis

Joko Sustiyo, Suzanne Bonner, Ammar Abdul Aziz, Risti Permani

The University of Queensland, Brisbane, Australia

Keywords:

2. Agricultural Finance

10. Development Economics

Paper Abstract:

Smallholder farmers in Indonesia still face limited access to formal financing due to a lack of collateral and insufficient credit history. Government programmes such as the People's Business Credit (KUR) have not fully reduced dependence on high-interest informal loans. On the other hand, Agri-FinTech, such as peer-to-peer (P2P) lending, could be a viable financing option for farmers. By utilising credit scoring innovation (i.e. digital transaction history), Agri-FinTech has the potential to reduce information asymmetry and lower transaction costs. In Indonesia, the agricultural financing landscape includes KUR (banking), P2P lending, and informal credit (middlemen, cooperatives, community networks), which differ in terms of costs, requirements, and ease of access. However, there has not been any research discussing the benefits of using Agri-FinTech lending for smallholder farmers.

This study assesses the economic feasibility of utilising Agri-FinTech lending through a Social Cost-Benefit Analysis (SCBA), which is a systematic framework for evaluating programmes by comparing the value of all private and social costs and benefits to assess its net benefits. The analysis is quantified for one crop season in the use of Agri-FinTech lending. Empirical data were obtained from an online survey of 40 smallholder farmers (with less than 0.5 ha of land) and face-to-face interviews with five smallholder farmers in September–October 2024, across four provinces (East Java, West Java, South Sulawesi, and South Kalimantan). To complement the primary data, the study also used secondary (benefit transfers), including prices and costs from Statistics Indonesia (BPS) and shadow prices (e.g. mobile data costs) to extend the analysis. Ethical protocols, written consent, and respondent data protection were applied in accordance with applicable research codes and policies.

The research findings indicate that the use of Agri-FinTech lending by smallholder farmers is both personally and socially viable, with a benefit-cost ratio (BCR) greater than 1. The study finds that the main determining factors to the net benefit of using Agri-FinTech lending are the cost of interest and the benefit of not using informal credit. On the other hand, cyber and privacy risks, as well as the digital divide, are considered barriers to Agri-FinTech adoption, and therefore, must be addressed so that diverse farmers can access benefits equally.

The primary contribution of this study is that it is the first research to use SCBA in evaluating Agri-FinTech lending from the perspective of smallholder farmers. In addition, this paper also provides policy recommendations to reduce capital costs, strengthen risk assessment, and

improve financial literacy among smallholder farmers. It is expected to accelerate financial inclusion and improve the welfare of smallholder farmers in Indonesia, which collectively can contribute toward food system transformation in the country.

Financial Literacy and Farm Financial Performance: Evidence from Indonesian Rice Farmers

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[1]Universitas Brawijaya, Malang, Indonesia. [2]National Pingtung University of Science and Technology, Pingtung, Taiwan

Keywords:

2. Agricultural Finance

12. Econometric Modelling

Paper Abstract:

This study quantifies the effect of financial literacy on the financial performance of rice farmers in Indonesia. We analyze survey data from 405 farmers and address the endogeneity of literacy using two instrumental-variable estimators: two-stage predictor substitution (2SPS) and two-stage residual inclusion (2SRI). In the first stage, a Tobit model explains financial literacy; in the second stage, ordinary least squares relates predicted (or residual-adjusted) literacy to farm financial outcomes. Education, participation in extension activities, exposure to finance-related training, proximity to formal financial institutions, and access to subsidies are all positively associated with higher literacy, while larger household size is negatively associated. Higher financial literacy, in turn, significantly improves farmers' financial performance, with results robust across 2SPS and 2SRI specifications. These findings support targeted literacy programs integrated with extension and financial access initiatives, contributing to progress on SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 4 (Quality Education).

Cooperative equity structure and elite capture in agricultural credit provision: Panel data evidence from China

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Presentation Type:

3. Contributed Paper

Keywords:

2. Agricultural Finance

10. Development Economics

15. Farm Management and Farmer Behaviour

19. Impact Assessment

Paper Abstract:

Equity structure of agricultural cooperatives plays a significant role in shaping resource allocation, particularly in the provision of finance (e.g., credit, input loans, subsidies) to members. When voting rights are tied to capital contributions, wealthier or elite members can dominate decision-making. This increases the risk of elite capture, where those with political power, wealth, education, or social influence disproportionately appropriate the benefits of development programs or resources at the expense of the broader rural population that hold little equity and thus are politically weak. Elite capture typically reduces allocation efficiency of resources and may result in productivity loss, thereby impeding sustainable growth of the agricultural sector. Hence, a thorough understanding is needed as of how cooperative equity structure affects the level of elite capture in agricultural credit provision.

This study first establishes a theoretical framework to link equity structure with the extent of elite capture in the allocation of financial resources within an agricultural cooperative. It is shown that equity weight in cooperative governance (the extent equity affects collective decision power), the efficiency of converting power into financial allocation, and equity inequality (the difference in equity shares among cooperative members) all increase the level of elite capture. This risk is amplified when elites can easily convert decision-making power into resource control.

The core hypotheses directly follow from these theoretical predictions: agricultural cooperatives with equity-weighted governance structures and higher equity inequality exhibit higher elite capture in financial resource allocation. Three sub-hypotheses are therefore specified:

H1: As the share of equity held by elites increases, the proportion of finance received by elites increases.

H2: The effect is stronger when voting power is proportional to equity.

H3: Institutional oversight moderates the relationship between equity inequality and elite capture.

These relationships are then empirically tested using a panel data set collected in 2016 and 2019 in China. Apart from the key explanatory variables from the above hypotheses, other covariates such as the size of cooperative (number of members), land ownership distribution, average income/assets of members, education levels of members and locations are carefully controlled for. Fixed effects regressions are estimated with both OLS and instrumental variables (2SLS). Moreover, robustness exercises are implemented with alternative definition of elite, different measures of finance capture, while heterogeneity of possible impacts is further explored through subsample analyses by cooperative size and region. The findings will provide some insight into the elite capture scenarios in rural China, and speak to certain policy designs that could help minimize the distortion of credit allocation and promote agricultural growth.

Parallel Session: Environment & Agriculture

08:30 - 09:50 Friday, 13th February, 2026

P Riverbank R6B

Chair: Md Monirul Islam

Transforming Oil Palm Smallholders' Path to Sustainability: Willingness to Adopt Sustainable Practices in Malaysia

Mahirah Kamaludin[1,2], Farah Hannani Ahmad Perdous[1], Azlina A.A[1]

[1]Universiti Malaysia Terengganu, Terengganu, Malaysia. [2]Universitas Brawijaya, Malang, Indonesia

Keywords:

3. Agricultural Production

14. Environmental Economics

Paper Abstract:

The palm oil sector is a cornerstone of Malaysia's agricultural economy and plays a vital role in supporting livelihoods, food security, and global supply chains. However, concerns over environmental degradation, biodiversity loss, and unsustainable production practices continue to challenge the sector's long-term viability. Addressing these challenges requires a transformation in the agri-food system, particularly among independent smallholder oil palm farmers who contribute significantly to national output yet often lack the resources to transition to sustainable practices.

This study aims to assess independent smallholders' willingness to adopt sustainable practices in Malaysia, with a focus on Terengganu, Kelantan, and Pahang state. Specifically, it evaluates the economic trade-offs smallholders are prepared to make when adopting practices that reduce environmental impacts, such as lowering chemical fertiliser use, engaging in biodiversity conservation, and participating in certification schemes. The research is motivated by Goal 2 of the Sustainable Development Goals (SDGs), to promote sustainable agriculture as well as the aspirations of the National Policy on Biological Diversity (2016 - 2025), which calls for balancing economic growth with environmental protection.

A Choice Experiment (CE) method was employed to estimate smallholders' preferences for five attributes: (i) reduction in chemical fertiliser use, (ii) training and support programmes, (iii) biodiversity and habitat conservation, (iv) certification, and (v) financial compensation. Data were collected through a purposive sampling of 110 smallholders, and the multinomial logit model was applied to quantify the economic value of each attribute. The findings reveal that smallholders are willing to adopt sustainable practices. These insights highlight the economic incentives and structural support required to encourage adoption of sustainable practices among smallholders.

The study contributes to the broader discourse on transformations in agri-food and environmental systems by providing evidence-based insights into how smallholders can be effectively integrated into sustainability initiatives. By identifying the attributes that influence smallholders' willingness to adopt sustainable practices, the research offers policy-relevant recommendations for designing targeted interventions, including subsidy schemes, capacity-building programmes, and market-based incentives. Such measures can enhance the competitiveness of Malaysia's palm oil sector, reduce its environmental footprint, and support rural socio-economic development.

Ultimately, this research demonstrates that the transition towards sustainable palm oil production is not only an environmental imperative but also an economic opportunity for smallholders. By aligning smallholders' economic incentives with sustainability goals, the study underscores the potential for palm oil to contribute meaningfully to the transformation of energy, agri-food, and environmental systems in Malaysia and beyond.

Persist or perish: The sequential adoption dynamics of farmers' sustainability transitions in India

Ranjan Kumar Ghosh[1], Ankit Saha[1], Udit Rana[1], Vikram Patil[2]

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Keywords:

11. Ecological Economics

25. Policy Analysis

Paper Abstract:

The policy environment in India allows farmers a period of three years to adopt sustainable agricultural practices (SAPs). Sequentially, farmers are tracked annually for their abeyance to chemical use. Only at the end of the third year they are certified and allowed to label their products as organic or sustainable. The fact, however, is that many farmers drop out and only a small percentage reach the finishing line at the end of the third year. This provides us an opportunity to analyze what are the critical factors in the long-term adoption of SAPs. We conduct a primary survey of 400 farmers that enrolled into the sustainability adoption program. A sequential logit model is applied to assess year-wise decision making of whether to 'drop out' after year one, 'endeavor' till the end of year two, or 'persist' through the third year. Results suggest that in the first transition, that is, from year one to year two, farmers that have abundant groundwater irrigation drop out of SAPs. In the second transition, that is, year two to year three, costly inputs and sticky output markets make them drop out of SAPs. Interestingly, female farmers are less likely to get past the first transition, but once they do so, they tend to be more persistent than their male counterparts during the second transition. Broadly compared, low risk farmers, majorly in rainfed irrigation areas and having adequate livestock, ultimately graduate as fully certified farmers. Moreover, farmers' perception that SAPs will incur lower cultivation costs in the future, encourages both endeavor and persistence. Peer

motivation also emerges as a significant determinant of continued adoption. Our study is a first of its kind attempt to uncover the tension between persistence and despondency when adopting SAPs in a context where the policy frameworks are based upon static incentives.

Urban Expansion and Agricultural Land Conversion in São Paulo State (Brazil)

SARA TAVARES

USP, São Paulo, Brazil

Keywords:

3. Agricultural Production

14. Environmental Economics

Paper Abstract:

This study examines recent transformations in land use and land cover in the state of São Paulo (Brazil), highlighting the relationship between urban expansion and the reduction of agricultural areas. The analysis is based on MapBiomas data, which allow tracking the evolution of land cover across São Paulo municipalities over the past two decades. The focus is on municipalities that experienced significant losses in agricultural land, particularly temporary and permanent crops, alongside the growth of urban areas. The main objective is to understand how these transformations are distributed across space and what territorial patterns can be observed in this process.

The research assumes that urban expansion does not occur uniformly but results from the interaction of multiple factors, such as location, logistical connectivity, real estate dynamics, and infrastructure pressures. Accordingly, it seeks to identify whether municipalities located near metropolitan regions or transport corridors exhibit higher intensity in converting agricultural land to urban uses, compared to those situated in more peripheral areas of the state. This territorial heterogeneity is fundamental to understanding how local processes interact with broader trends in the reconfiguration of São Paulo's territory.

From a methodological standpoint, the study adopts a spatial analysis approach, using comparative mapping and quantification of land use changes by municipality. Thematic maps are produced to illustrate urban growth and agricultural land reduction, enabling the identification of patterns of concentration and dispersion across the territory. Additionally, the results are examined alongside basic population and geographic location data to explore preliminary relationships between urbanization and agricultural land loss.

Preliminary findings indicate that urbanization intensifies in areas with higher economic dynamism and proximity to consolidated urban centers, where real estate pressure and transport infrastructure play a central role in agricultural land conversion. Conversely, in regions more distant from metropolitan areas or less connected to transport corridors, agriculture tends to exhibit greater resilience to urbanization. These findings suggest that urban expansion in São Paulo not only reduces the availability of productive land but also introduces

new challenges for territorial management, directly affecting the sustainability of agro-food systems and the conservation of natural resources.

By providing evidence on the spatial patterns of agricultural-to-urban land transition, this study contributes to the discussion on balancing urban development, environmental conservation, and agricultural production. In particular, it highlights the need for public policies that consider regional heterogeneity and local specificities in the formulation of strategies for land use, and especially in the sustainable accommodation of urban growth.

Smallholder Resilience through Farm Diversification: Econometric Insights from the Coastal Ganges Delta

Md. Monirul Islam[1,2], Kalyan Roy[3], Rupak Goswami[3], Mohammad Chhiddikur Rahman[4], Mst. Esmat Ara Begum[5], Sonali Mallick[6], Afroza Chowdhury[4,7], Mohammed Mainuddin[8], Marta Monjardino[1]

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Keywords:

3. Agricultural Production

14. Environmental Economics

Paper Abstract:

Farm diversification (FD) is a vital strategy for improving the resilience and livelihoods of smallholder farmers climate climate-vulnerable regions. This study examines the drivers of FD in the salt-affected coastal area of the Ganges Delta, spanning across Bangladesh and the Indian state of West Bengal. This area is characterised by high soil salinity, waterlogging, tidal flooding, and constrained irrigation, affecting agricultural productivity and influencing livelihood strategies. Using survey data from 271 farming households, we quantified FD with the Simpson's Index of Diversity (SID) based on income contributions from cereals, vegetables, livestock, and fish. We identified the drivers of diversification using censored Tobit regression to account for the bounded nature of the SID, complemented by conditional quantile regression (CQR) to capture heterogeneity across the diversification spectrum.

The results from Tobit regression indicate that FD (mean SID = 0.439; SD = 0.242) is significantly encouraged by formal education, livestock ownership, and access to multiple water sources, whereas it is constrained by family migration, increased savings, and higher farm income. Environmental stressors, particularly soil salinity and waterlogging, exert complex influences: while decreasing salinity and waterlogging are positively associated with FD, rising salinity also

promotes adaptive diversification through salt-tolerant crops and integrated farming systems. The CQR analysis shows that the effects of these key determinants vary across the diversification level. Livestock ownership and Environmental stressors, particularly soil salinity and waterlogging, also play a critical role in low and medium-diversified farms, whereas education and farm income have a stronger effect on highly diversified ones. Migration affects FD negatively at lower quantiles, suggesting that less diversified farms are more sensitive to labour constraints. These findings demonstrate how heterogeneity in socioeconomic, farm resource, and environmental factors shapes farm households' diversification strategies.

These insights underscore the need for targeted policy interventions to promote FD and agricultural sustainability in the climate-vulnerable Gangetic coastal region. Key recommendations include improving access to financial services, strengthening extension and vocational training, supporting livestock-based livelihoods, and mitigating environmental risks through soil and water conservation and climate adaptation strategies. Gender-inclusive policies and rural non-farm employment are also vital. These integrated measures are essential to promote resilient, diversified farming systems and improve smallholder livelihoods in environmentally stressed coastal regions.

Parallel Session: Agribusiness

08:30 - 09:50 Friday, 13th February, 2026

P Riverbank R8

Chair: Wiji Tri Wilujeng

The Economics of Farm Advocacy and Policy Development

Samuel Miller

NSW Farmers, Sydney, Australia

Keywords:

1. Agribusiness

25. Policy Analysis

Paper Abstract:

The transformation of agri-food, environmental, and energy systems cannot be understood separately from the political economy of farm policy development. The opposition or acceptance of farming communities of policies promoting renewable or gas energy, biodiversity or water conservation, animal or human welfare standards, and international trade – to name a few – has had profound impacts on the shape, timeline, and ultimate outcomes for those policies, regardless of how objectively optimal they may be. Yet surprisingly little is known, and much is misunderstood regarding the way farmer advocacy organisations gain and retain members, select which basket of political outcomes, services and projects are desired, exert influence and are in turn influenced. This research utilises a case study of the NSW Farmers Association and examines the extent to which its internal architecture and external relationships with other farming organisations, and modes of political influence can be explained by the existing economic theories of collective action and lobbying. I find that the prevailing political economy models fail to adequately account for the unique context in which farm advocacy organisations operate, which in turn shapes their operational intricacies and idiosyncrasies. The findings will inform researchers and practitioners seeking to understand or catalyse society-wide transformations in natural resource systems, as well as those working in or adjacent to the farm advocacy ecosystem seeking to navigate and negotiate those same transformations.

Revisiting smallholder-inclusive business models amidst digital transformation and sustainability pressures: a systematic literature review

Venty Fitriany Nurunsia, Dr. Rajendra Adhikari, Dr. Risti Permani

The University of Queensland, Gatton, Australia

Keywords:

1. Agribusiness

15. Farm Management and Farmer Behaviour

Paper Abstract:

Smallholder farmers represent 84% of farms globally but manage only 12% of the world's agricultural land. Despite this, they contribute to 35% of global food production, playing a crucial role in feeding populations and sustaining rural livelihoods. However, in spite of their contribution to food security, smallholder farmers continue to face low incomes, limited access to markets and information, and structural disadvantages—highlighting their vulnerability within the agri-food system. Addressing these challenges requires a supportive ecosystem that strengthens not only farmers' technical capacities but also their managerial and business skills. This would improve their bargaining power while ensuring they remain relevant amidst ongoing digital transformation and increasing pressures towards sustainability.

Farmers' organisations have emerged as key collective structures in many countries. These organisations prioritise the needs, values, and aspirations of local communities, in addition to aiming for profit maximisation. They offer smallholders a means to pool resources, coordinate efforts, and access markets more effectively. There is growing evidence that farmers' organisations serve as effective alternatives for smallholders to operate more efficiently. However, such inclusive initiatives often struggle to achieve business sustainability and experience slow growth, which may, in the long term, hinder smallholder empowerment. Unlike the traditional business model, inclusive or community-based business models prioritise the needs, values, and aspirations of the local community, which often create some trade-offs with their profit-maximising goals. While understanding inclusive business models in agriculture has long been a subject in the literature, there is limited recent research on understanding how smallholder farmers can leverage and ensure the relevance of business models amidst digital transformation and stronger pressures toward sustainability.

This study addresses the gaps through a Systematic Literature Review (SLR), aiming to synthesise existing knowledge on smallholder-inclusive business models. In addition to the descriptive analysis of the reviewed studies, the results are analysed through a thematic analysis focusing on three key aspects. First, the study characterises the different types of business models in agriculture and examines the extent to which smallholder farmers participate in them. Second, it reviews key drivers and barriers to the of adoption and implementation of these models by smallholder farmers. Third, the study revisits the relevance of various business models with current trends by looking at their impacts on promoting digital transformation and sustainability among smallholder farmers. Finally, insights from the SLR are used to develop a novel framework, adapted from the Theory of Change and the Food Systems Framework, for identifying pathways toward inclusive, innovative and sustainable food systems through optimising the role of smallholder-inclusive business models. This research provides valuable benefits for diverse stakeholders—including policymakers, agribusiness actors, development partners, and farmer organisations—by offering evidence-based insights to guide strategies that support broader food system transformation.

Boosting Smallholder Farm Income: The Economic Edge of Maize Additive Intercropping in Bangladesh

Md Salauddin Palash, Md. Wakilur Rahman, Ismay Shathi

Bangladesh Agricultural University, Mymensingh, Bangladesh

Keywords:

1. Agribusiness

3. Agricultural Production

Paper Abstract:

Smallholder farmers in Bangladesh consistently struggle with unstable incomes due to climate-related risks and volatile maize market prices, highlighting the urgent need for sustainable intensification strategies. Short-duration vegetables or legumes added to full-density maize rows through additive intercropping systems enable farmers to boost their income and develop more resilient crops. This research compares the economic outcomes of sole maize cultivation with those of maize intercropped with additional crops, drawing on data from 528 smallholder farmers in central and northern Bangladesh. The study uses propensity score matching (PSM) and analyzing net returns, benefit-cost ratios (BCR) and tests for price and labor sensitivity. Results show that the intercropped systems generated 23% higher net returns and improved BCR than monoculture maize resulting from the additional income from the intercrops, and reduced labour and input expenses by 2%. PSM estimates of average treatment effects on treated (ATT) were modest and insignificant, likely due to the small treatment sample, although balancing diagnostics confirmed robustness. Sensitivity analyses confirmed resilience, with intercropping sustaining 15-25% profit advantages under ±20% market fluctuations. Success in the central regions was driven by the adoption of brassica intercrops, which proved to be an effective agroecological adaptation. These findings support intercropping's role in boosting smallholder incomes and as a buffer for risk. Finally, it is expected that the implementation of region-specific extension services, input subsidies and market linkages by policymakers will lead to a 20-30% profit increase and will contribute to achieving climate-smart agriculture targets.

Enhancing the Resilience of Farmers in Dealing with Price Volatility in Indonesia

Wiji Tri Wilujeng, Adam Komarek, Risti Permani

The University of Queensland, Gatton, Australia

Keywords:

1. Agribusiness

12. Econometric Modelling

Paper Abstract:

Food price volatility is a major threat to the livelihoods of smallholder farmers in Indonesia, often resulting in income loss, food insecurity, and even bankruptcy. Farmers' adaptive

capacity—defined as the ability to modify actions to reduce sensitivity to shocks—is a key determinant of farmers' resilience. Previous studies on adaptive capacity mostly focus on farm production, such as the capacity to deal with climate change. There is a gap in our current understanding of farmers' capacity to mitigate food price volatility.

This study leverages data from a project funded by the Department of Foreign Affairs and Trade (DFAT) through the Knowledge Partnership Platform Australia-Indonesia (KONEKSI), led by the University of Queensland, which focuses on the peri-urban food supply systems of Java, Indonesia, in 2023-2024. The research concentrated on two key commodities—rice and kangkong (water spinach)—in peri-urban areas surrounding major cities like Jakarta, Surabaya, and Yogyakarta. 640 farmers were selected using purposive sampling from 12 sub-districts across these regions. This study uses a multivariate probit model to analyse farmers' characteristics influencing the adoption of various coping strategies for price volatility, including the role of gender. This study measures adaptive capacity by the number of coping strategies adopted by farmers, including forward contracts, storage and timing of sales, cost management, and crop diversification. Propensity Score Matching (PSM) was used to explore the association between adaptive capacity and whether selling price volatility affects their income.

Our preliminary descriptive statistics highlight some key characteristics of the surveyed farmers. A significant portion of the respondents have low levels of formal education, even among those with extensive farming experience. The data also suggests a disparity in income between genders, with male farmers tending to earn more, especially when they have additional off-farm occupations. Importantly, the analysis indicates a positive correlation between land ownership and access to storage facilities with farming income for both male and female farmers, underscoring their importance in strategies for building resilience. These initial findings lay the groundwork for a more detailed analysis of the factors that influence a farmer's decision to adopt specific coping strategies and how these strategies contribute to their overall resilience against market shocks. Results from the multivariate probit and PSM models provide a comprehensive understanding of adaptive capacity in the face of price volatility, proven to be critical amidst rising geopolitical tension, costs of production, and inefficient supply chain governance, while putting much stronger pressure on promoting the sustainability of production and food security.

Keywords: adaptive capacity, food price volatility, propensity score, resilience

Special Session: Climate Change and Resilient Investment Planning

10:20 - 11:50 Friday, 13th February, 2026

P Riverbank R2

This special session, jointly organised by the Enabling Resilience Investment (ERI) team at CSIRO and the Innovative Research Planet Institute (IPRI) at Swinburne University of Technology, will span 1.5 hours and combine two complementary formats: a policy roundtable and a series of oral presentations. Together, they aim to provide a comprehensive exploration of resilient investment planning in the context of climate change in Australia. The policy roundtable discussion, featuring representatives from CSIRO, the City of Holdfast Bay, the Limestone Coast Landscape Board, Infrastructure South Australia, and South Australia for Environment and Water, will focus on the role of resilient investment planning in both natural and built capital across Australia. Following the roundtable, the session will transition to four oral presentations that delve into the economics and interdisciplinary approaches required to build resilient infrastructure systems in Australia.

These presentations will explore: Framework for Quantifying Benefits of Resilient Infrastructure (Sorada Tapsuwan, Swinburne University); Impacts of Infrastructure Disruption and Adaptation Strategies (Quoc Anh Nguyen, CSIRO); Place-Based Resilience in Telecommunications (Paul Box, CSIRO); andGovernance Models for Natural Capital Investment (Russell Gorddard, CSIRO)

The Policy Roundtable will last for 45 minutes, with a short pause for attendees who wish to attend only this part. The presentations will be 10 minutes each, followed by a collective 5-minute Q&A session to encourage audience engagement and cross-disciplinary discussion.

Session Organisers: Stefanos Xenarios (CSIRO), Russell Wise (CSIRO), Sorada Tapsuwan (Swinburne University)

Climate Change and Resilient Investment Planning in Australia

Stefanos Xenarios[1], Russ Wise[1], Sorada Tapsuwan[2], Quoc Anh Nguyen[1], Paul Box[3], Russell Goddard[1]

[1]CSIRO, Canberra, Australia. [2]Swinburne University of Technology, Melbourne, Australia. [3]CSIRO, Sydney, Australia

Keywords:

8. Climate Change

14. Environmental Economics

Special Session: Carbon and Biodiversity Market Opportunities and Challenges

10:20 - 11:50 Friday, 13th February, 2026

P Riverbank R3

Short talks on evolving carbon market methods implemented on the land and in emerging markets for nature.

Professor Brent Sohngen (Ohio State University) – Challenges in forest offset schemes: a global perspective - Oversupply from REDD+ credits, mistrust of the methods, and low demand from buyers bound mainly by voluntary incentives drive low prices for forest carbon in offset markets around the world. However, new methods and approaches are emerging to manage long-standing integrity concerns. This presentation examines how these approaches could help spur new investments and encourage new demand for forest-based offset credits, buoying prices.

Mr Alex Sharples (Researcher, Scarlatti, Auckland NZ) – Macro-scale implications of landowners' incentives under the New Zealand Emissions Trading Scheme A presentation on macroeconomic modelling of how rules in NZ climate policy affect a forester's decision to delay or avoid harvest under high carbon prices using a simple real-options model of harvest timing under forward price uncertainty and varying risk aversion. Individual-level decision rules to are scaled to a national-scale multi-decade projections of carbon sequestration and NZU prices using a simulated partial equilibrium model.

Mr Carl Binning - Australian Commonwealth Clean Energy Regulator, Operations Manager Carbon Credit and Nature Repair Market – Australian Markets for Carbon and Nature Dr Binning will describe opportunities and challenges for Australian Carbon and Nature Markets in the context of over three decades of experience with evolution of market based environmental policy in Australia

Dr Cathy Waters (Greencollar) – new methods for biodiversity and carbon markets The Australian Carbon Credit (ACCU) framework has continued to evolve over the past 10-years +, responding to issues of integrity and confidence in on-ground outcomes. Carbon markets have expanded land use opportunities in some regions and remain a major vehicle to raise finance to fund land-scape scale conservation activities. Cathy will compare and contrast three mechanisms to value nature: (i) carbon markets, (ii) incentives through government initiatives and (ii) private benefits of natural capital improvement and farm business profitability, highlighting the unique and common themes between each.

Roundtable discussion 1 minute each panelist to explain the biggest challenge in markets for carbon and nature. follow-up questions from audience and moderator.

Carbon and Biodiversity Market Opportunities and Challenges I

Jeff Connor[1], Brent Sohngen[2], Alex Sharples[3], Carl Binning[4]

[1]Adelaide University, Adelaide, Australia. [2]Ohio State Univeristy, Columbus, Ohio, USA. [3]Scarletti, Auckland, New Zealand. [4]Australian Commonwealth Clean Energy Regulator, Canberra, Australia

Keywords:

7. Carbon and Nature Markets

8. Climate Change

21. Land and Natural Resource Management

Special Session: Editorial Insights: Shaping the Narrative on Energy, Agri-Food & Environmental Transitions

10:20 - 11:50 Friday, 13th February, 2026

P Riverbank R4

In the face of rapid transformations in global energy, agri-food, and environmental systems, the role of academic publishing has never been more critical in guiding impactful research and fostering evidence-based policy. Editors act as gatekeepers and thought leaders, influencing which questions are prioritized, which methods gain traction, and how findings are communicated beyond academia. By convening editors from leading journals spanning public economics, industrial organization, and agricultural and applied economics, this session creates a rare platform for AARES members to gain first-hand perspectives on how editorial priorities are evolving in response to these global challenges. The session not only equips researchers with practical strategies for successful publication but also strengthens connections between Australasian scholars and the broader international research community.

This session brings together prominent journal editors from diverse yet complementary fields—including public economics, industrial organization, and agricultural and applied economics—to share their latest research insights and editorial strategies. Our aim is to illuminate how editorial perspectives and decisions can influence research directions in energy, agri-food, and environmental systems, generating broader impact across academia, policy, and practice.

We feature leading outlets: the Journal of Public Economics (JPubE) and the International Journal of Industrial Organization (IJIO)—pillars in public policy, taxation, and market structure; the Applied Economic Perspectives and Policy (AEPP)—the flagship journal of AAEA; and the Australian Journal of Agricultural and Resource Economics (AJARE)—AARES's official journal, highly respected for research in agricultural economics and resource management in the Australasian and Asia-Pacific regions.

The distinguished panel includes: Shanjun Li (Stanford University) – Editor of JPubE and IJIO; expert in environmental economics, energy policy, and industrial organization. Yu (Yvette) Zhang (Texas A&M University) – Editor of AEPP; specialist in development economics, innovation, agri-technology, and rural transformation. David Stern, Johannes Sauer, and Yu Sheng (AJARE Editors) – bringing expertise in ecological and environmental economics, production economics and econometric modelling, and structural change/productivity in emerging economies.

Potential themes include: the electric vehicle industry and policy evaluation for energy transitions; resilience and innovation in agri-food systems and rural sectors; Rural transformation, policy designs, and pathways to sustainability.

Editorial Insights: Shaping the Narrative on Energy, Agri-Food & Environmental Transitions

David Stern[1], Yu Sheng[1], Yu Yvette Zhang[2], Shanjun Li[3]

[1]Australian National University, Canberra, Australia. [2]Texas A&M University, College Station, USA. [3]Stanford University, Stanford, USA

Keywords:

10. Development Economics

25. Policy Analysis

Special Session: The importance of norms in landholder adoption of environmental improvements

10:20 - 11:50 Friday, 13th February, 2026

P Riverbank R5

THEME: There is a well-established literature on adoption drivers of management practices and new technology in agriculture, with factors such as financial returns, risk, understanding and complexity playing important roles. However, adoption decisions to achieve environmental improvements in agricultural settings are more complicated, even if public funds in the form of grants or subsidies are used to provide financial support. Landholder involvement in environmental programs can be limited to actions that provide both production and environmental benefits in the short term, or meet the interests of particular sub-groups of landholders. To identify other options for motivating landholder involvement in environmental programs, this ARC-Discovery Project is focused on key challenges and opportunities in using social incentives to enhance pro-environmental behaviour. The focus of this session is to identify the role that norms may have in landholder decisions, and the potential for norms to foster action on delivering Landcare- relevant public goods on private land.

FORMAT: The session is planned to be a 90-minute session, involving four presentations

PRESENTERS

Chair: Prof. John Rolfe, CQU; Prof. Steven Schilizzi, UWA; Praseed Thapa, CQU; Mr. Daniel Martinez Felip, UWA;Ms. Mimi Salminah, AU.

The importance of norms in landholder adoption of environmental improvements

Stephen Schilizzi[1], Praseed Thapa[2], Mimi Salminah[3], Daniel Martinez[1], John Rolfe[2]

[1]University of Western Australia, Perth, Australia. [2]CQUniversity, Rockhampton, Australia. [3]University of Adelaide, Adelaide, Australia

Keywords:

14. Environmental Economics

26. Practice Change and Adoption

Special Session: Risk and Resilience in Agri-food Labour Markets

10:20 - 11:50 Friday, 13th February, 2026

P Riverbank R6

Our special session will bring together researchers with expertise in the economics of agricultural labour: Margaret Jodlowski (Ohio State University), Alexandra Hill (UC Berkeley), Sarah Whitnall (University of Western Australia), and Katie Ricketts (CSIRO). Our speakers bring unique perspectives from distinct high-income country contexts on what it means for labour markets to be resilient in the current, yet heterogeneous geopolitical, environmental, and social climate. Resilience is often conceived of as the ability of a system to return to its pre-shock levels following a shock. While this may be a compelling definition, whether a return to the "status quo" is a desirable feature of labour markets in high-income countries' agricultural systems remains an open question and serves as an important motivation for our special session.

In this session, we confront various pressures that impact agricultural managers and workers alike; particularly migrants and temporary workers. One commonality across these contexts is that much of the strenuous work of agricultural production is done by migrant workers, such that current market and political structures may be displacing risk on vulnerable populations. These risks include a rise in difficult working conditions including increased exposure to extreme weather events, socio-political shifts, and market-based changes in demand and supply. We explore whether the policy and market-based tools currently in place in our respective countries have been successful at mitigating risks or promoting resilience in agricultural labour markets. We also explore many of the short-term events and long-term trends that are causing agricultural labour markets to respond across many different margins.

Each presenter will share a brief (roughly 15 minute) presentation of ongoing work in this area. Each presenter will focus on a different pressure point in the current labour system: climatic (Whitnall), workplace policies (Hill), political (Jodlowski), and market-based (Ricketts). These presentations will be followed by a panel discussion in which we will discuss the commonalities across these pressures and geopolitical contexts.

Risk and Resilience in Agri-food Labour Markets

Sarah Whitnall[1], Margaret Jodlowski[2], Alexandra Hill[3], Katie Ricketts[4]

[1]University of Western Australia, Perth, Australia. [2]The Ohio State University, Columbus, USA. [3]University of California, Berkeley, Berkeley, USA. [4]CSIRO, Canberra, Australia

Keywords:

3. Agricultural Production

23. Market Design and Policy

28. Uncertainty and Risk

Special Session: Diversification as a pathway to transformation of food systems in South Asia

10:20 - 11:50 Friday, 13th February, 2026

P Riverbank R6B

In South Asia, most countries pursue agricultural development strategies designed to raise smallholder incomes, promote diversification, and ensure sustainable resource use. A key approach is diversifying agricultural systems through high-value crops and allied activities, but this must advance in ways that are both inclusive and sustainable. This session will showcase studies from three ACIAR projects all exploring different elements of diversification. Presentations will cover linking policy frameworks to on-the-ground practices, examining the drivers of livelihood diversification, and assessing the impacts of intercropping and sustainable intensification. The session aims to raise awareness of the broad value of diversification in smallholder farming systems, and the multiple and varied approaches possible. It will demonstrate the benefits of several projects being closely aligned both in on-ground teams and at the project leader level, which maximizes ACIAR investment and enables greater leverage. Ultimately, it will identify lessons that are applicable not only in South Asia but across smallholder production systems more generally, helping advance the sustainable transformation of food systems globally.

This session will comprise of four individual presentations, followed by a thirty-minute discussion session where the audience will be welcomed to comment and query the presenters.

The session will be Chaired by Dr Jack Hetherington (ACIAR). Presenters include Dr Ravi Nandi (CIMMYT), Dr Tamara Jackson (Adelaide University), Dr Mainuddin and Dr Marta Monjardino (CSIRO), and Professor Fay Rola-Rubzen (Curtin University).

Diversification as a pathway to transformation of food systems in South Asia

Tamara Jackson[1], Ravi Nandi[2], Mohammad Mainuddin[3], Marta Monjardino[4], Fay Rola-Rubzen[5]

[1]Adelaide University, Adelaide, Australia. [2]CIMMYT, Dhaka, Bangladesh. [3]CSIRO, Canberra, Australia. [4]CSIRO, Adelaide, Australia. [5]Curtin University, Perth, Australia

Keywords:

10. Development Economics

26. Practice Change and Adoption

Special Session: Does behavioral economics have a role in transforming Australian agri-food systems? Emergent understanding and communication of risk

10:20 - 11:50 Friday, 13th February, 2026

P Riverbank R8

Transforming Australian agri-food systems in response to climate, environmental, and market challenges requires more than technological and economic solutions. Lasting change depends on how people perceive, interpret, and respond to risk. This makes behavioural economics a critical but often underutilised lens for understanding and facilitating transitions in the agri-food sector.

This special session will explore why successful transformation is only possible through a deeper understanding of stakeholder behaviour, and how that understanding can be translated into improved extension and communication strategies. By embedding behavioural science into agricultural research, policy, and practice, we can catalyse change processes that are otherwise stalled by mismatches between evidence, incentives, and decision-making realities on the ground.

Speakers in this session are early- or mid-career researchers, showcasing the next generation of behavioural science leadership in agriculture. To complement these emerging voices, the panel will also invite senior experts Dr Rick Llewellyn (CSIRO) and Professor David Pannell (UWA) to contribute to the panel discussion, offering strategic reflections on the role of behavioural economics in agri-food system transformation. Key topics to be explored include:

- Why change in agri-food systems cannot be facilitated without insights from behavioural science;

- Empirical evidence of how risky decisions are made in Australian systems

- Differences between grain grower and advisor decision processes, and the implications for designing effective extension.

The session will use an interactive format designed to move beyond traditional presentations. Each panelist will give a concise 7-minute expert presentation, followed by a 3-minute Menti-based audience interaction and 5 minutes of facilitated discussion. This cycle will repeat four times, creating a dynamic rhythm of content, reflection, and engagement. The session will close with a 15-minute open discussion that brings together insights across panellists and participants.

Our aim is not only to showcase behavioural economists and social scientists but to engage a broader audience—including applied economists, policy-makers, advisors, and practitioners—who are curious about the “what, why, and how” of behavioural economics and its potential role in agri-food system transformation. Participants will leave with a clearer sense of how

behavioural insights can be practically applied to improve communication, design interventions, and ultimately accelerate systemic change.

Confirmed and invited presenters include:

- Dr Nadia Streletskaya (Oregon State University) – Experimental insights into risk perception and decision-making, drawing on prospect theory and forestry/agriculture parallels;

- Dr German Puga (University of Western Australia) – Behavioural economics perspectives on current decision-making processes by Australian grain Growers;

- Dr Masood Azeem (CSIRO) – empirical evidence of System 1 and System 2 thinking in risky decision making by Australian Grain Growers

- Dr Brendan Brown (CSIRO) – How Australian Grain growers and their advisors think differently about risky decisions.

Through this blend of concise expert input, interactive audience engagement, and discussion, the session will provoke new thinking about the role of behavioural economics in agri-food transformation, highlight emerging Australian and international research, and build connections between disciplines and stakeholders interested in the future of farming systems.

Does behavioral economics have a role in transforming Australian agri-food systems? Emergent understanding and communication of risk

Brendan Brown[1], Nadia Streletskaya[2], German Puga[3], Masood Azeem[1]

[1]CSIRO, Adelaide, Australia. [2]Oregon State University, Corvallis, USA. [3]UWA, Perth, Australia

Keywords:

1. Agribusiness

3. Agricultural Production

4. Agricultural Technology and Innovation

15. Farm Management and Farmer Behaviour

18. Grains and Cropping Systems

26. Practice Change and Adoption

28. Uncertainty and Risk

Posters

11:50 - 13:00, 11- 13th February, 2026

P Riverbank Foyer

Assessing the Potential for Biofuel Production within a Conventional Fuel System

Arnaud Dragicevic[1,2], Chanon Thongtai[1], Nicolo Pecora[3]

[1]Chulalongkorn University, Bangkok, Thailand. [2]CIRANO, Montreal, Canada. [3]Universita Cattolica del Sacro Cuore, Milan, Italy

Keywords:

13. Energy and Utilities

24. Mathematical Programming

Paper Abstract:

This paper develops a multi-tiered fuel supply chain model to assess the feasibility of integrating biofuels into a conventional fuel system. Using a Nash-type bargaining framework that captures both economic and environmental goals, we model negotiations between upstream and midstream actors over fuel allocations. The model, framed as a variational inequality within a multicriteria decision-making structure, incorporates key policy tools such as subsidies for biofuels and carbon taxes on fossil fuels. Numerical simulations, implemented via a hybrid optimization-neural network algorithm, show that moderate public incentives and balanced bargaining power can support a partial but meaningful shift toward biofuels. Under realistic conditions, up to 45% of total fuel output may be reallocated to biofuels, yielding substantial but incomplete decarbonization. This transition raises fuel prices and reduces production volumes, highlighting trade-offs from internalizing environmental externalities. Sensitivity analyses indicate that modest policies can affect the fuel mix, though deeper change likely demands stronger interventions. Overall, the study shows how negotiation-driven strategies, combined with fiscal incentives, can promote biofuel adoption, while emphasizing the limits of incremental approaches to large-scale decarbonization.

The Nexus Between Energy Poverty and Food Consumption among Rural Households

Junpeng Li[1], Wanglin Ma[2]

[1]Huaiyin Normal University, Huai'an, China. [2]Lincoln University, Christchurch, New Zealand

Keywords:

13. Energy and Utilities

17. Food, Health and Nutrition

Paper Abstract:

Reducing energy poverty and food insecurity remains a pressing challenge in rural areas of developing countries. This study examines the link between multidimensional energy poverty (MEP) and food consumption in rural China, using data from eastern, central, and western provinces. We construct an MEP index and analyze its effects on food expenditure, dietary diversity, and consumption of key food items using a conditional mixed process model. Our findings show that households facing MEP spend significantly less on food and exhibit lower dietary diversity. These negative effects are more pronounced among low-income households and those headed by females. In contrast, male-headed households show greater dietary diversity losses when facing energy poverty. Furthermore, MEP significantly reduces the consumption of vegetables, aquatic products, and pork, implying adverse impacts on nutrition. These results suggest that addressing rural energy poverty should be a priority in improving food security and nutrition in developing contexts.

From Cosmetic Standards to Sustainable Choices: Consumer Valuation of Imperfect Bananas in Australia

Mallika Roy[1,2], Darshana Rajapaksa[1,3], Delwar Akbar[1], Azad Rahman[1]

[1]Central Queensland University, Rockhampton, Australia. [2]University of Chittagong, Chittagong, Bangladesh. [3]3. Department of the Environment, Tourism, Science and Innovation, Queensland Government, Brisbane, Australia

Keywords:

9. Consumer Choice

12. Econometric Modelling

Paper Abstract:

Food waste caused by strict grading and cosmetic standards has become a pressing challenge for sustainable agri-food systems. Large volumes of edible produce, particularly fruits like bananas, are rejected for minor surface blemishes or size variations, resulting in unnecessary environmental, economic, and nutritional losses. This wasteful practice contributes to greenhouse gas emissions, squanders water and energy inputs, and reduces farmers' income while affordable food becomes scarcer for consumers. Although consumer awareness of food waste is growing, retail and market responses remain limited, and the potential role of consumer demand in reversing these losses is not fully understood. Despite the global momentum toward circular and sustainable food systems, research gaps persist regarding consumers' willingness to pay (WTP) for cosmetically imperfect produce and the socio-demographic and attitudinal factors that influence such decisions. Few empirical studies have examined these relationships in Australia, where bananas are a staple fruit and one of the most heavily standardised horticultural products. Understanding these behavioural and market dynamics is critical for designing interventions that reintroduce imperfect produce into food supply chains and reduce food waste at scale. This study addresses these gaps by exploring Australian consumers' WTP for cosmetically imperfect bananas discarded due to grading and

standardisation. A structured questionnaire survey of 1,202 respondents across Queensland was conducted to capture insights into pro-environmental attitudes, purchase intentions, and demographic characteristics. The Contingent Valuation Method (CVM) was used to elicit consumers' monetary valuation, while an ordered probit regression model identified the key socio-economic and behavioural drivers of WTP. The results show that women and environmentally conscious consumers express significantly higher willingness to purchase imperfect bananas, indicating that pro-environmental attitudes strongly align with sustainable food choices. Higher levels of education and household income are also positively associated with WTP: educated respondents demonstrate greater awareness of sustainability and food security issues, while higher-income households possess both the financial capacity and the inclination to pay a premium for waste-reducing alternatives. Together, these findings provide robust microeconomic evidence that consumer acceptance of imperfect produce can serve as a viable strategy to reduce on-farm and retail food waste. Policy recommendations emerge directly from these findings. Retailers and policymakers should integrate imperfect produce into mainstream markets through price incentives, dedicated product lines, and consumer education campaigns that normalise cosmetic variation without compromising safety or nutrition. Public programs promoting food-waste awareness, school-level education on food value, and clearer labelling (e.g., "imperfect but just as good") can reinforce positive consumer norms. Incentives for farmers and supply-chain actors to channel cosmetically imperfect produce into alternative markets—such as processing, food service, or donation—would further enhance resource efficiency and circular economy goals. By combining economic valuation with behavioural analysis, this study demonstrates that consumer willingness to embrace imperfect bananas can drive systemic change, reducing food waste and advancing sustainable consumption in Australia's horticultural supply chain.

Impacts of Crop Diversification on Subjective Well-being: Evidence from Rural Sri Lanka

Wenguang Zhang

Lincoln University, Canterbury, New Zealand

Keywords:

14. Environmental Economics

15. Farm Management and Farmer Behaviour

Paper Abstract:

This paper examines the impact of crop diversification on subjective well-being among rural households in Sri Lanka using survey data from 2025. We use a Conditional Mixed Process (CMP) model to analyze these effects. We focus on two key indicators: well-being and life satisfaction. We find that crop diversification is significantly and positively associated with both well-being and life satisfaction. The impact varies across farm sizes, with large farms benefiting most from diversification in terms of well-being. Mechanism analysis suggests that these improvements are partly mediated by higher farm income and better self-reported health among diversified households. These findings highlight crop diversification as a promising strategy for improving

rural well-being in Sri Lanka. At the policy level, promoting diversification through targeted extension services, financial incentives, and improved market access can not only enhance household resilience and income but also improve the quality of life in agricultural communities.

The Nexus of Animal Nutrition, Animal Health, and Economics: An Analysis of the New Zealand Sheep Industry

Peter Tozer[1], Thomas Marsh[2]

[1]Massey University, Palmerston North, New Zealand. [2]Washington State University, Pullman, USA

Keywords:

22. Livestock Systems

24. Mathematical Programming

Paper Abstract:

The sheep industry in New Zealand makes a significant contribution to the economic welfare of the country, and animal health and reproduction are some of the drivers of sheepmeat production, particularly lamb meat. New Zealand exports approximately 90% of lamb meat produced and is one of the major exporters of sheepmeat in the global market. Improvements in, or indeed "poor" animal health, and or reproduction could make large impacts on economic welfare of the country. In this research we examine the impact that sheep animal health, measured through changes in mortality or reproduction rates, has on economic welfare, measured as producer and consumer surplus, through a dynamic bio-economic optimisation model. The model incorporates domestic and export markets through demand functions for each of these actors in the sheep meat economy. The results show that in nearly all scenarios modelled where animal health is below the baseline levels, producers and consumers are worse off in terms of economic surplus. The range in consumer surplus loss was from $NZ15.5 million to $NZ89.7 million, for producer surplus the losses ranged from $NZ5.9 million to $NZ131.4 million. In only one scenario, where lamb death rates increased marginally over the base was producer surplus positive at $NZ2.1 million, however, this positive surplus was outweighed by a reduction in consumer surplus of $NZ18.9 million. The biggest losses in total economic surplus occurred in scenarios with lower than base line reproduction rates and higher than baseline mortality rates in breeding ewes and lambs.

Rice Market Disruptions under Export Bans: Assessing the Role of Non-Tariff Trade Barriers

Walter Ac Pangan[1], Nathan Hendricks[2]

[1]Virginia Polytechnic Institute and State University, Blacksburg, USA. [2]Kansas State University, Manhattan, USA

Keywords:

20. International Trade

25. Policy Analysis

Paper Abstract:

In 2024, as a consequence of export market restrictions imposed by major rice exporters, the FAO's price index of rice reached its highest nominal level in 16 years. When international grain market prices surge, national governments frequently intervene to minimize the impact on their domestic food markets. India, the world's major rice exporter, implemented an export ban on broken rice in 2022 and on non-basmati rice in 2023. This paper investigates the effects of the rice export bans imposed by India on the trade flows in the international market. We exploit the differences in export quantities and values on the two major types of rice . Our results indicate that the impact of the broken rice export ban had a larger impact on the international broken rice markets since India had a larger market share (38%) than the milled rice (30%). While the exports of milled rice from other major exporters increased statistically significantly, the exports for broken rice did not increase. Myanmar, Vietnam, and Thailand showed substancial increase in their exports, while Pakistan's exports decreased. This research provides insights into how export restrictions can influence trade patterns in international markets and the stability of the global rice market.

Government Trust, Taxes, and Macroeconomic Transitions: A DSGE Analysis of Dual-Sector Dynamics

Ahmad Ali Rifan, Raul Barreto, Yaping Shan

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Keywords:

10. Development Economics

25. Policy Analysis

Paper Abstract:

Abstract

Low tax compliance and pervasive informality are major constraints on fiscal capacity across many developing economies, particularly in countries like Indonesia, where these issues are closely linked to citizens' trust in government institutions.

This study introduces a novel Dynamic Stochastic General Equilibrium (DSGE) model designed to explore this crucial link. Our framework integrates a dual-sector (formal–informal) production structure, endogenous tax evasion, and evolving government trust to investigate how institutional confidence shapes macroeconomic performance. In the model, households make labor and consumption choices across sectors based on CES preferences, while firms vary in capital intensity and tax exposure. The government funds public capital—which then influences citizen trust through perceived service quality—by collecting distortionary taxes on consumption, labor, capital, and bonds.

Calibrated using developing countries' structural parameters and simulated in Dynare-MATLAB, the model yields compelling results. We find that a negative trust shock (e.g., from corruption or poor service delivery) significantly increases tax evasion and drives labor toward the informal sector. Although this initially boosts disposable income and consumption—creating a temporary "illusion of prosperity"—it ultimately leads to a decline in private investment and formal output, slowing long-term growth. Crucially, the analysis highlights the macro-critical role of institutional trust: when confidence falters, fiscal multipliers weaken and the accumulation of vital public capital deteriorates.

This trust-based DSGE framework offers a powerful new lens for policy design in economies where tax compliance and government credibility are fragile. Future work will incorporate nominal rigidities to study the interaction between monetary and fiscal policy, as well as open-economy channels of trust transmission.

Keywords

Developing economies, Institutional Trust, Fiscal Capacity, Tax Compliance, Informal Sector, Tax Evasion, Dynamic Stochastic General Equilibrium (DSGE).

Farmers' Knowledge, Perceived Benefits and Support Needed For Scaling Biochar Adoption in Timor Leste: Findings From FGDs

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Keywords:

1. Agribusiness

3. Agricultural Production

Paper Abstract:

Focus Group Discussions (FGDs) were conducted across four different groups between 14 May and 30May 2025. One group comprised of adopters and another of non-adopters in Bobonaro Municipality (with Maliana representing adopters and Cailaco non-adopters), and another group comprised of adopters and non-adopters in Baucau Municipality (with Laga as the adopter group and Triloca as the non-adopter group). The primary objective of the FGDs was to exchange ideas, opinions, and experiences among participants regarding their knowledge, perceived benefits and issues and challenges in using biochar. Data was collected to gain insights into farmers' thoughts and behaviors concerning biochar. Two FGDs were held with biochar adopters and two with non-adopters, allowing for a comparison of awareness levels, interest, and the constraints faced by both groups. In total, 46 participants took part—29 males and 17 females—from various farmer groups.

We observed varying levels of knowledge and awareness about biochar across regions. Farmers obtained their information from extension agents, researchers, and other agencies. Those who

have started using biochar on their lands for crops such as vegetables, onions, and rice nurseries perceived it's role as an organic soil enhancer, linking it to a reduction in the need for chemical fertilisers. The perceived benefits of biochar among farmers include improved plant growth and crop yields, enhanced soil structure and fertility, and a reduced need for chemical fertilisers, especially when mixed with manure. Interest in biochar remains high among all groups, with a focus on self-use. However, there is limited interest in commercial sales due to challenges such as the inability to produce biochar at scale and restricted access to necessary materials and tools.

Farmers lack resources such as rice hulls, maize stalks, and coconut husks, as well as equipment like oil drums, nets, compressors, and firewood, to produce biochar. Limited knowledge persists in some areas; while some groups have received training, many others still lack practical experience and the necessary supporting infrastructure. Participants expressed the need for government and agency support, which could include hands-on training, demonstration plots, access to materials and equipment, technical extension support, printed guides, and group training. Supportive government policies are vital for scaling biochar production and usage among smallholder farmers.

Local Preference and Intra-regional Trade Barriers: Evidence from Rice in China's Middle–Lower Yangtze

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Keywords:

4. Agricultural Technology and Innovation

18. Grains and Cropping Systems

Paper Abstract:

Building a unified national market and dismantling regional trade barriers are crucial for developing the crop seed market and safeguarding food security. China operates a crop variety certification system for major crops, with market-entry decisions resting with provincial authorities. Using a unique dataset on rice varieties from the middle–lower Yangtze region spanning 1983–2021, we show that the cultivated area of locally bred varieties is, on average, 2.05 times that of nonlocal varieties, indicating pronounced local preference. Evidence further suggests that administrative gatekeeping at the market-entry stage is a primary driver of this pattern. The local preference is more pronounced in provinces with weaker breeding R&D capacity and in core rice-producing provinces; moreover, it is associated with lower subsequent productivity growth. These findings reveal an underappreciated mechanism by which local preference, operating through market entry, constitutes intra-regional trade barriers under a decentralized regime.

Herbicide Application Among Maize Farmers in Bobonaro, Ainaro and Covalima Municipalities

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Keywords:

4. Agricultural Technology and Innovation

26. Practice Change and Adoption

Paper Abstract:

Over the past decade, East Timorese farmers have begun to use external inputs, including tractors, new seed varieties and herbicides. Farmers obtained access to tractors and new seed varieties from the **TL government through the Ministry of Agriculture, Livestock, Fishery and Forestry (MALFF) and its partners**. However, it is up to the farmers to apply and adopt herbicides. Hence, there is no information regarding the effects of herbicide adoption on farmers' productivity and livelihood.

As part of an ACIAR-funded project, researchers from AI-Com and MALFF SOSEK conducted qualitative research in five targeted locations within three municipalities in Timor-Leste. The study done comprised of field observations in the five targeted locations, Key-Informant Interviews (N=14) and Focus Group Discussion (N=90) activity with both male and female farmers. The objective is to examine the changes and impacts of farming practices involving herbicide, the benefits of these changes, and perceptions regarding herbicide application.

Findings showed that herbicide application enabled rural households to expand farming area, significantly increased household income and reduced working time in the field during land preparation and weeding. However, concerns have arisen about the safe and proper use of herbicides and their impact on human health and soil quality. Given that farmers have been applying herbicides without formal guidance from relevant authorities, it is essential that they receive training or clear instructions on how to use these chemicals safely and effectively.

Barriers and Levers for Inclusive Smallholder Agribusiness: A Systemic Analysis of Cambodia's Organic Rice Sector

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Keywords:

1. Agribusiness

2. Agricultural Finance

10. Development Economics

28. Uncertainty and Risk

30. Value Chain Analysis and Marketing

Paper Abstract:

Smallholder farmers in emerging economies are increasingly exposed to interconnected risks such as climate variability, volatile markets, and fragile institutions. Cambodia's organic rice sector exemplifies these pressures while also showcasing how farmers and cooperatives adapt to them. Agricultural cooperatives have become key institutional channels, linking smallholders to high-value export markets while serving as spaces for testing new production and organizational strategies. This study applies systems perspective to analyze how diversity among producers shapes value chain dynamics and financial resilience. We employed a mixed-methods design, combining survey data from 282 organic farmers in Preah Vihear province with key informant interviews and participatory workshops. Using cluster analysis of resource endowments, market orientation, and production strategies, we identified three distinct farmer types: (1) resource-constrained traditionalists, (2) semi-commercial farmers with moderate assets, and (3) diversified, capital-intensive producers. These typologies then informed a participatory system-mapping exercise, which traced key feedback loops influencing financial stability. Two contrasting dynamics emerged. On one hand, a virtuous cycle of trust—reinforced by organic certification and cooperative support—stabilized market relations and strengthened farmer confidence. On the other hand, structural weaknesses, including export quota ceilings and delayed payments, generated liquidity constraints that disproportionately undermined poorer farmers' ability to reinvest in subsequent seasons, reinforcing a cycle of vulnerability. The findings point to several leverage points for improving system resilience and inclusivity: more reliable buyer arrangements, stronger cooperative governance, and improved post-harvest infrastructure. By explicitly linking farmer diversity, financial dynamics, and systemic feedbacks, the study illustrates how inequalities can persist even within collective models, but also where targeted interventions can promote more adaptive and inclusive value chains. Beyond Cambodia, the analysis provides broader insights into strengthening cooperative-led agrifood systems under conditions of uncertainty.

It's the Journey, not the Destination: Driving through Preferences with AI-Generated Landscapes

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Keywords:

14. Environmental Economics

29. Valuation

Paper Abstract:

Understanding how the public values trees in pastoral landscapes is important for designing land management policies. To explore these preferences, we developed a novel choice experiment framed as a hypothetical road trip, where travel time was introduced as a potential "cost." To implement this approach, we used generative artificial intelligence (GenAI) tools to create photorealistic images of grazing landscapes, systematically varying the extent, configuration, and species of trees while holding other features of the landscape constant.

Analysis with latent class models revealed substantial heterogeneity in preferences. We identified five distinct classes. Some respondents treated travel time as a cost, while others were indifferent or even expressed positive preferences for additional travel time, indicating that the journey itself provides utility. Preferences for native trees were consistently positive across most classes, while views on the extent and configuration of tree cover diverged. Some classes preferred clusters or full planting, while others favoured more open, treeless landscapes.

This study contributes in three ways: (1) it provides new insights into the diversity of public views on trees in pastoral landscapes, (2) it demonstrates how GenAI-generated imagery combined with road trip framing can enrich stated preference methods, and (3) it highlights important implications for valuation approaches that use travel costs by showing that in some contexts, travel time may represent a benefit rather than a cost.

Wet-season burning in the tropical savannas of Kakadu National Park: Documenting recent fire activity and Indigenous perspectives

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Keywords:

8. Climate Change

21. Land and Natural Resource Management

Paper Abstract:

Fire management during the wet season can help mitigate risks associated with extreme dry-season fire events in tropical savannas. In Australia's jointly managed Kakadu National Park, Traditional Owners sought documentation of knowledge of, experiences with, and perspectives on the practice. We spatially analyse recent fire activity and, following an Indigenous knowledge framework, elicit Traditional Owners' views using qualitative interviews. Analysis of satellite data from 2015-2024 provides evidence of annual wet-season fire activity, which peaked in 2018-19. We show that aerially-lit fires have been substantially larger than ground-lit fires; a finding that conflicts with Traditional Owners' preferences for small-scale fires accompanied by ground observations of important plants and animals. Interview findings

highlight the diverse range of motivations Traditional Owners have for undertaking fire management in the wet season, such as reducing the future fuel load, maintaining access for cultural activities, and protecting bushtucker. Support for future wet-season burning was conditional on a range of factors, including ensuring cultural protocols are followed and having an Indigenous-led process. Our findings suggest that customary and contemporary approaches to burning during the wet-season can be combined to support Traditional Owners' land management aspirations. Results can help inform the development of a fire management strategy in Kakadu National Park and across other tropical savanna regions.

Does the Naming Matter for Consumer Preferences for Plant-based Meat Alternatives?

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Keywords:

9. Consumer Choice

17. Food, Health and Nutrition

Paper Abstract:

In recent years, there has been growing debate worldwide over the labeling of plant-based meat alternatives (PBMA). However, little attention has been given to how labeling policy influences consumer preferences for PBMA. Therefore, this study investigates how the use of different names shapes consumers' willingness to pay for PBMA products by using consumer survey data on Chinese consumers. The study employed a choice experiment with a between-subjects design to examine how sensitive consumer preferences for PBMA products are to different names, including 'plant-based', 'plant-protein', 'vegan', 'plant-made', 'artificial', and 'plant-protein and vegan'. The results revealed that consumers assigned the highest valuation to the term 'plant-protein and vegan', followed by 'plant-made', 'plant-based', and 'vegan', while the lowest valuation was given to 'artificial'. Moreover, the findings indicate that these valuations vary significantly across consumer characteristics. This is the first study to examine how the labeling guidelines suggested by the Group Standard for Plant-Based Meat influence consumer preferences for PBMA. The findings provide valuable implications for policymakers developing labeling regulations and for firms designing effective marketing strategies.

The impact of extreme weather events on child stunting in sub-Saharan Africa -Focusing on the Republic of Zambia-

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Keywords:

8. Climate Change

17. Food, Health and Nutrition

Paper Abstract:

Introduction

Child undernutrition still remains one of the most serious problems in Africa. Stunting, a form of chronic undernutrition, which is defined as low height-for-age z-scores (HAZ), affects 150.2 million children under five years (hereafter children), or 23.2% of the world's 647.3 million children (WHO 2025). In Africa, the prevalence of child stunting is 30.3% of 181.8 million, which is higher than the global rate of 23.2% (WHO 2025). In recent years, it has been indicated that climate change including extreme weather events are having a negative impact on child undernutrition.

IPCC defines extreme weather events (hereafter EWEs) as an event that is rare at a particular place and time of year (IPCC 2021). There are limited studies that explicitly assess EWEs, although EWEs are expected to worsen and more frequent, especially in sub-Saharan Africa. Amondo et al. (2023) shows that EWEs affect child stunting through causing negative impact on calorie, protein, and micronutrients supply using the Standardized Precipitation Index. Further, Bratti et al. (2021) finds that prenatal exposure to heat waves may directly affect children's health by applying the Heat Wave Magnitude Index daily.

This study aims to elucidate the relationship between EWEs and child stunting using the explicit EWEs indicator to contribute to the formulation of adaptation strategies, focusing on Zambia, a sub-Saharan country where stunting rates among children remain high at 32.3% (WHO 2025).

Method and Data

The impact of EWEs on child stunting was estimated using multiple regression analysis. The dependent variable is child *i*'s *HAZ* at year *t*. Independent variables are as follows: the Standardized Precipitation-Evapotranspiration Index (*SPEI*) value(s) which child *i* experienced at *h* year(s) before year *t*, as an indicator of EWEs; a squared term of the *SPEI* to account for nonlinear relationships; *sex* dummies; *provincial* dummies; and *year* dummies.

Height and age data for Zambian children was provided from the Demographic and Health Surveys (DHS) 1992 to 2018.

The *SPEI* was calculated by using precipitation and Potential Evapotranspiration (PET) data from the Climate Research Unit: Time Series (CRU TS) 4.08 from 1901 to 2023. It is provided as a standardized value, we defined as a drought condition when its value is less than SD-2 and the case of greater than SD+2 indicates flood.

Results and Discussion

Multiple regression analysis shows statistically significant negative differences from 0 in the squared term of the SPEI for children, 1, 2, 3, and 4-year-old. When we consider the time lag of the impact of climate, coefficients of 1, 3, 4-year-old children are -0.56, -0.83, and -0.61 at the 0-year-old, respectively, and coefficient of 2-year-old children is 1.15 at the 1-year-old. While these estimates indicate that exposure to extreme SPEI value at 0-1 age has more negative

impact on children's HAZ, provincial dummies show that Central province which was the most affected by EWEs has higher HAZ than other provinces. This indicates that there can be selection bias in that the sample is comprised only of children who are resilient to EWEs.

From Wool to Water to Food Systems: Seventy Years of Agricultural and Resource Economics Research

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Keywords:

19. Impact Assessment

29. Valuation

Paper Abstract:

This study traces the evolution of agricultural and resource economics research in Australia through an analysis of nearly 1,500 papers published in the *Australian Journal of Agricultural Economics* and its successor, the *Australian Journal of Agricultural and Resource Economics*, between 1957 and 2025. Using bibliometric and text-mining methods, we identify long-term shifts in research topics, methods, and collaboration patterns. Over the past seven decades, the field has expanded from production and trade issues to encompass environmental management, climate change, food systems, and sustainability, while adopting increasingly diverse and data-driven methods. The analysis also highlights trends in institutional contributions, authorship diversity, and internationalisation of the AJARE community. Together, these findings provide a quantitative portrait of how agricultural and resource economics in Australia have evolved in response to changing global and policy contexts.

Systemic Challenges in Tropical Banana Farming: From Causes to Consequences Limiting Farmers' Reflective Learning and Economic Performance

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Keywords:

3. Agricultural Production

15. Farm Management and Farmer Behaviour

Paper Abstract:

Regarding the issue of low banana productivity, farmers are indeed experiencing difficulties in controlling plant pests. However, the common assumption that this is the only major problem in banana cultivation needs further study to understand the root of the problem and determine a comprehensive strategy. Therefore, a systematic study is needed that includes various dimensions, not only the physical environment but also the environment related to socio-economic aspect. This research aims to understanding what systemic constraints within the socio-ecological system of smallholder banana farming and how they hinder farmers' learning. Data were collected using Soft Systems Methodology by engaging smallholder banana farmers and multi-actors in a series of participatory workshops conducted in the Yogyakarta Special Region. The results indicate that both personal and environmental dimensions influence each other. Pests and diseases are not just factors causing banana production but also belong to consequences in an ecological system, which further enhance and limit farmers' personality and income. In local government, policy is not only supported by national programs but also by ecological systems. As a consequence in the systems, unsupportive policy hinders the advancement of banana farmers' learning processes, regeneration, and their perceptions of banana prices as either barriers or opportunities, so influencing their decision-making about product sales. It concludes that we cannot view banana farming systems in a linear dimension but rather as a reinforcing and balancing socio-ecological interaction.

Integrating Healthy Food Choices with Low Household Food Waste: A Systematic Literature Review

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Keywords:

14. Environmental Economics

17. Food, Health and Nutrition

Paper Abstract:

Healthy dietary choices are central to individual health; however, large quantities of healthy food, particularly fruits and vegetables, are often discarded within households in developed countries. Minimising healthy food waste can promote sustainable consumption and enhance nutrition outcomes. However, existing evidence on the relationship between healthy eating and household food waste remains limited and fragmented. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines, this review systematically synthesised 38 peer-reviewed studies across five major databases. The study identified three major themes on the relationship between healthy eating and household food waste: (1) reductions in waste linked to healthier eating habits, (2) increased waste resulting

from healthier eating habits, and (3) mixed findings on the relationship between healthy food consumption and household food waste. Moreover, healthier diets (rich in fruits and vegetables) can reduce avoidable waste through improved food provisioning behaviours, but may simultaneously increase unavoidable waste (by-products of consumption and preparation). Also, purchasing patterns emerged as a key food management behavioural determinant linking healthy food and waste outcomes. Based on the synthesised literature, a theoretical framework linking healthy food, purchasing and household waste generation has been developed. The framework conceptualises provisioning behaviours, moderating factors (geographic location, cultural norms, dietary preferences, and individual health status), and the categorisation of food waste (avoidable, unavoidable and total (unavoidable and avoidable)) as key influences on household food waste from healthy food consumption. Reducing healthy food waste while promoting its consumption should be prioritised through policies on food literacy education, need-based purchasing, improved storage practices, and circular-economy approaches that support the separation and reusing of the unavoidable fruit and vegetable waste at the household and national levels.

Keywords: Healthy food; Households; Food waste; Sustainable consumption; Purchasing; Circular economy: Provisioning behaviours, systematic literature review

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Economic and Environmental Returns of Tree and Shrub Cultivation in Saline Landscapes of Pakistan's Indus Basin

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Keywords:

14. Environmental Economics

21. Land and Natural Resource Management

Paper Abstract:

Agriculture in the Indus Basin of Pakistan is increasingly constrained by soil salinity, waterlogging, and climate stress, challenging to erode farm incomes, degrade natural resources, and threaten national food security. This study explores how tree- and shrub-based agroforestry systems can drive an economic and ecological transformation of saline-affected landscapes, turning degraded lands into productive, climate-resilient assets. The study covers five districts (Dera Ghazi Khan, Bahawalpur, Khairpur Mirs, Tando Allahyar and Thatta) and integrates quantitative and qualitative approaches, including 120 structured surveys and 14 focus group discussions.

A comparative economic analysis was conducted using standard investment appraisal indicators *viz*. Net Present Value (NPV), Benefit-Cost Ratio (BCR), Internal Rate of Return (IRR), and Payback Period and complemented by environmental valuation tools such as contingent valuation, hedonic pricing, and avoided-cost methods. The findings reveal that tree and shrub species such as Neem (*Azadirachta indica*), Ber (*Ziziphus mauritiana*), and Chiku (*Manilkara*

zapota) yield significantly higher returns than conventional crops like wheat, rice, and sugarcane. With BCRs ranging between 1.9 and 2.5, compared to 1.0–1.1 for conventional crops, these species offer superior profitability, shorter payback periods, and enhanced resilience to salinity and drought. Once established, tree-based systems reduce water and input dependency, providing economic stability under rising energy and fertiliser costs.

Beyond financial performance, the study quantifies multiple environmental co-benefits. Deep-rooted trees lower water tables and mitigate waterlogging; carbon sequestration contributes to climate-change mitigation; improved soil structure and organic matter restore fertility; and vegetative cover reduces erosion and dust pollution. The analysis estimates substantial avoided costs in soil rehabilitation, air quality improvement, and water regulation, demonstrating that these ecosystem services, though often unpriced, significantly enhance total economic value.

Surveyed farmers indicated strong willingness (40–67%) to adopt tree and shrub cultivation if supported by credit, sapling subsidies, and reliable market access. However, barriers persist: limited availability of salt-tolerant varieties, weak agroforestry extension services, and underdeveloped markets for timber and non-timber products. The study recommends targeted policy measures, including payments for ecosystem services, investment in nursery and market infrastructure, and integration of agroforestry into national salinity control and climate adaptation programs.

By demonstrating the economic viability and environmental value of trees and shrubs in marginal lands, this research reframes agroforestry as both a livelihood strategy and a climate adaptation pathway. It highlights how smallholders can shift from input-intensive, low-return farming to regenerative production systems that restore degraded soils, sequester carbon, and stabilise rural incomes. The findings provide evidence for policies that link agricultural productivity, ecosystem restoration, and climate resilience, key pillars in transforming agri-food and environmental systems for a sustainable future.

Spatial and Temporal Dynamics of Herbicide Resistance Across Australia's Agro-Ecological Zones

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Keywords:

18. Grains and Cropping Systems

28. Uncertainty and Risk

Paper Abstract:

Herbicide resistance (HR) is one of the greatest threats to sustainable crop production in Australia, weeds costing over AUD 4 billion annually in yield losses and control measures. Despite extensive local surveys, comprehensive national-scale assessments of the spatial and

temporal dynamics of resistance remain scarce. This study addresses this gap by examining the distribution, trends and rates of change in HR among the main weed species in Australia's agro-ecological zones (AEZs) between 1998 and 2021.

The analysis draws on a large national paddock survey dataset conducted through an initiative funded by the Grains Research and Development Corporation (GRDC). The various regional surveys comprised a total of 7,260 field samples classified by species, herbicide mode of action (MOA), density and location. The two most dominant species, annual ryegrass (*Lolium rigidum*) and wild oats (*Avena* spp.), were the focus of detailed analyses within four major AEZs (WA Central, NSW/VIC Slopes, SA/VIC Mallee and NSW/QLD SE). Temporal trends were evaluated using resistance prevalence and rate-of-change models, while correlation matrices assessed co-selection patterns among MOAs. Additionally, aggregate forecasting models, including ordinary least squares (OLS), polynomial regression and extreme gradient boosting (XGBoost), were applied to project glyphosate (MOA Group 9) and imidazolinone (MOA Group 2) HR prevalence trajectories.

The results highlight significant regional variability in resistance development. Ryegrass exhibited a rapid increase in resistance following the introduction of herbicides, particularly to Group 1 FOP1, and Group 2 sulfonylureas and imidazolinones, with prevalence often exceeding 90% within a decade. Glyphosate resistance emerged much later due to slow development but has steadily expanded in the NSW/VIC Slopes and SA/VIC Mallee regions, raising concerns about the erosion of this key herbicide. Wild oats displayed lower overall resistance; however, significant Group 2 sulfonylurea and Group 1 FOP1 resistance emerged in specific AEZs. Correlation analyses revealed positive associations among several MOAs, suggesting cross-resistance pressures driven by intensive reliance on chemicals. Forecasting results show divergent resistance trajectories: polynomial models project rapid acceleration by 2030, OLS indicate steady linear increases, and XGBoost suggests potential stabilisation, underscoring the uncertainty of long-term resistance dynamics.

These findings have critical implications for weed management and agricultural policy. Firstly, they highlight the need for monitoring frameworks tailored to specific regions that go beyond localised field studies to capture AEZ-level resistance patterns. Secondly, the results reinforce the urgent need to diversify weed control strategies, as reliance on a single MOA or a limited number of MOAs can rapidly lead to resistance saturation. Last but not least, integrating these insights into national weed management and industry guidelines could support more sustainable herbicide stewardship by balancing chemical and non-chemical options within integrated weed management systems.

By combining long-term survey data with spatially explicit analyses and forecasting, this study provides the first national, AEZ-resolved account of HR dynamics in Australia. It highlights retrospective lessons from past herbicide use and forward-looking scenarios that can inform evidence-based policies to safeguard the productivity and resilience of Australian cropping systems.

When science meets policy: Successes and shortfalls in groundwater governance in Pakistan

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Keywords:

21. Land and Natural Resource Management

25. Policy Analysis

31. Water

Paper Abstract:

Groundwater is an invisible yet indispensable freshwater resource sustaining Pakistan's irrigated agriculture. It underpins food security, rural livelihoods, and climate resilience across the Indus Basin. Empirical evidence indicates that the Indus Basin Irrigation System (IBIS) is the primary driver of aquifer recharge, as seepage from its canals and distributaries sustains groundwater storage. However, this recharge is spatially uneven: groundwater quality remains relatively fresh near perennial canals, while areas reliant on seasonal or flood flows experience progressive salinisation and water table depletion. Despite these disparities, groundwater has long served as a vital buffer during droughts, heatwaves, and surface water shortages. Such recurrent hydrological stress and unreliable canal supplies have spurred a massive expansion of privately owned tube wells, now exceeding 1.5 million nationwide. Yet the discharge capacities, operating schedules, and cumulative extraction of these wells remain largely undocumented. As competition for groundwater intensifies, traditional notions of safe yield limits, assumptions of natural replenishment and economic feasibility limitations with increasing depth of pumping, have become obsolete. Moreover, provincial government subsidies like support price for higher yield and solarization of tube wells are accelerating unsustainable behaviours. Nonetheless, provincial governments have also begun establishing groundwater regulatory bodies and approving legal instruments to govern use. However, these frameworks remain nascent and largely unenforced. Their design has often been reactive, prompted by crisis, rather than informed by robust scientific evidence or an understanding of user behaviour. While scientific studies on groundwater hydrology, quality, and modelling abound, they frequently remain disconnected from the socio-institutional realities that determine implementation. Evidence generation has not fully captured the behavioural, economic, and political dimensions that shape pumping decisions at the farm level. Consequently, scientific knowledge has informed "what should be done," but not "how" or "why" it is not done. This study critically examines these 'successes and shortfalls' of scientific evidence in shaping groundwater governance in Pakistan and argues for an innovative, systems-based approach to integrate behavioural insights with scientific understanding for more effective governance outcomes.

Exploring Gender Roles and Access to Resources in Agricultural Innovation Adoption in Timor-Leste

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Keywords:

4. Agricultural Technology and Innovation

26. Practice Change and Adoption

Paper Abstract:

A study was conducted in four municipalities in the north coast of Timor-Leste to assess gender access to resources among farmers who adopted mung bean after maize innovations and those who did not adopt. A mixed-methods approach was applied, combining household surveys with male (N=234)- and female-headed households (N=236), two focus group discussions with male (N=11) and female farmers (N=16) , and key informant interviews (N=9, F=3 and M=6).

The objectives of the study are to understand 1) farmers' current practices of growing maize, 2) farmers' interest in adopting new innovations implemented and 3) the impact of the innovations on women farmers (women cultivators and women-headed households).

The findings revealed that both male and female household heads are joint owners of income-generating and household assets. In terms of participation in farming activities, both male and female household heads were involved in almost all tasks. However, female household heads showed lower participation in purchasing agricultural inputs, while male household heads were less involved in non-farming economic activities such as small businesses, self-employment, and trading during the past 12 months.

Regarding household decision-making, both male and female household heads tended to make joint decisions on various aspects of family life. However, female household heads were less involved in decisions related to selling cash crops, buying inputs, and selling livestock. Conversely, male household heads were less engaged in decisions concerning minor household expenditures, such as food consumption and daily household needs. Only widows or widowers made decisions independently.

The study also found that female household heads who possess knowledge of agricultural innovations were more likely to participate in decision-making related to selling cash crops and purchasing inputs than those without such knowledge. Cultural norms and traditional divisions of household responsibilities between men and women seem to influence decisions related to livestock sales and minor household expenditures.

The study concludes that promoting joint participation of men and women in training, demonstration plots, and group activities can enhance both their farming knowledge and their collaborative roles within the household.

Parallel Session: Agricultural & Resource Finance & Markets

13:00 - 14:20 Friday, 13th February, 2026

P Riverbank R2-R4

Chair: Ram Pandit

The evolving role of the private sector in climate-related aspects of the global food system transformation

David Shearer[1], Risti Permani[2]

[1]Australian National University, Canberra, Australia. [2]University of Queensland, Brisbane, Australia

Keywords:

2. Agricultural Finance

8. Climate Change

Paper Abstract:

Transforming the global food system to address the USD11.6 trillion of hidden costs (FAO 2024), requires an investment of US$300-400 billion per year (UNFSS 2023). CPI (2023) identifies that seven times the current level of climate finance for the food system transformation is needed, with the IPCC (2023) identifying 10 – 31 times more funding needed in the agriculture, forestry and land-use (AFOLU) sectors for achieving the climate targets within the Paris Agreement.

The significant level of investment required, the identified gaps and limited public funding have increased the calls on the private sector to increase its investment in climate-related issues. An associated analysis of benefits has accompanied these calls (Sutton et al, 2024).

Although there is some dispute on the availability of finance, a combination of repurposing the $638B of distorting agricultural policies spent from 2016-2018 (Gautam et al. 2022) and the USD630B of private capital available per annum (CPI 2023) is commonly identified as required for the global food system transformation.

The paper will firstly present an analysis of the evolving role of the private sector over the past 10 years, a timeframe that coincides with a rapid increase in the academic literature on food system transformation, and secondly, the private sector's investments globally to address climate-related issues in the food system transformation.

The private sector has been evolving its contribution to areas where climate and nutrition goals are integrated, making broader contributions to innovative financing, and deriving benefits through cross-sectoral partnerships. However, although the broad systems narrative is adopted, much of the focus of both the private sector and its partnerships remains on technology innovation at the production level, which may be restricting impact.

Although there has been an upswing of private sector investment in climate-related issues, much of the investment remains constrained within the country where its headquarters is located, predominately within high-income countries, with limited spill over to benefit low- and middle-income countries, where much of the negative impact of climate in the food system occurs. The private sector is not investing in climate-related research and innovation, which has been fundamental and highly effective in addressing other global challenges, nor is it substantially engaged in the policy-making process. These factors limit the private sector's investments in climate-related issues, hindering the required transformation of the food system.

Maximising the investment made by the private sector will be crucial in achieving the required food system transformation. Innovation, not only technology, but in policies, institutions and capacity will be central to this aim, along with clarity and consistency across various contexts to guide the private sector's contribution to the ongoing evolution of innovative financing and partnerships for sustainable impact.

Who Pays? Future Use of Land and How to Fund it

Alan Renwick, Michael Lyne, Paul Rutherford, Meike Guenther

Lincoln University, Christchurch, New Zealand

Keywords:

2. Agricultural Finance

Paper Abstract:

New Zealand's current land use systems have developed around a more stable climate, infrequent extreme events, and relatively consistent consumer preferences. However, the need to concurrently reduce emissions from agricultural production, comply with increasing regulation, meet changing customer and consumer demands as well as adapt to a changing climate, means that land use in the future is likely to look very different from land use now. In addition, the agricultural sector is clearly still vulnerable to cyclical commodity cycles and there is a need to diversify revenue streams to increase the resilience of the sector. Against this background, there are potentially significant benefits to the sector from diversifying land-use and/or adopting new operating principles (e.g. electrification) and technologies.

Little is known concerning the extent to which financial capital is available to support such changes in land-use or operating principles. A range of studies have examined future land uses, for example in response to climate change. However, they seldom take account of key social, economic and environmental factors that are likely to facilitate or act as barriers to change. That is, they often focus on what it might be like if certain change occurs rather than how that change will come about.

The overall aim of the paper is to fill the gap in our knowledge of the likely future demand for finance as a result of land-use change, the implications for the financial sector and what is needed to ensure finance is available.

Using a specially developed linear programming model and an existing integrated impact assessment model, the paper explores a number of possible scenarios for the agri-food sector, ranging from a focus on meeting emissions reduction targets to achieving ambitious targets for increased exports. The findings highlight that under current systems and technologies there are major trade-offs between environmental, social and economic outcomes across these scenarios. both at the farm level and at the level of the wider economy. Having identified the extent and nature of the trade-offs, the paper then discusses what is needed in terms of land use change to reduce the extent of these trade-offs and the funding models that will be required. The paper provides examples of successful land use change initiatives both in New Zealand and internationally.

It concludes that a coordinated and coherent approach across key stakeholders (including Government, Banks, Agribusiness Companies, Insurance, etc.) is needed to support land managers in making the necessary transition to more resilient land use. Potential models as to how this may work are provided.

Towards an insetting policy for Australia

Marit Kragt[1,2,3], Germán Puga[1,3]

[1]Centre for Agricultural Economics and Development, University of Western Australia, Perth, Australia. [2]Zero Net Emissions Agriculture Cooperative Research Centre, Perth, Australia. [3]Australian Research Council Training Centre for Behavioural Insights for Technology Adoption, Brisbane, Australia

Keywords:

7. Carbon and Nature Markets

8. Climate Change

Paper Abstract:

The world has seen a rise in carbon offsets markets, which allow organisations to buy carbon credits—linked to the reduction, avoidance, or removal of carbon dioxide or other greenhouse gases—to compensate for their emissions. Offset credits are typically generated through projects outside of the organisation's value chain. While they often represent a cheaper way of limiting growth in net emissions, they have been widely criticised in recent years.

Inserting approaches have emerged as an alternative to offsets. Insets are interventions to reduce emissions from within an organisation's own value chain. Where offsets allow a company to continue polluting, insetting requires companies to undertake projects that verifiably reduce the emissions embedded in their product. Insets are often accompanied by co-benefits, and can lead to more resilient value chains. Organisations can also make product-level claims that are not possible to make when offsetting their emissions. Further, the Australian and international voluntary and regulatory landscape promotes the development of insetting programs because of increased requirements to report on Scope 3 emissions.

Yet, there are imminent challenges. There is no clear definition of insetting, especially with regard to what will be counted as within a supply chain or value chain and how emissions reductions will be attributed to supply chain parties. For an insetting model to work in Australia, we need clarity on definitions, accounting standards, MRV requirements, and governance structures and registries (in addition disagreement on what interventions are counted). Future guidelines for insetting activities should be created with the current (and future) complex international voluntary and regulatory landscape in mind. An ideal insetting policy should ensure integrity, transparency and additionality, while at the same time not making the process too restrictive, complex, or expensive.

This presentation will describe the opportunities that insetting represents based on case study examples from throughout the world and detailed examples from the Australian agri-food sector. We will outline some of the questions that should be addressed to design an insetting policy for Australia. The research presented here is part of a national project, involving researchers, government and private businesses, that is developing insetting guidelines and policies for Australia. The project will include a proof-of-concept of an insetting program for the beef sector. The insights presented at AARES 2026 will be based on a review of the literature and the results of a series of interviews, workshops, and roundtables with experts.

Natural capital as an asset class: Land owners and investors' perspectives

Ram Pandit[1,2], Tom Picton-Warlow[3], Jon Sarmiento[1], Fiona Dempster[1], Lizzy Lowe[4]

[1]The University of Western Australia, Perth, Australia. [2]The Western Australian Biodiversity Science Institute, Perth, Australia. [3]Picton-Warlow MobileGlobal Pvt Ltd, Perth, Australia. [4]Edith Cowan University, Perth, Australia

Keywords:

2. Agricultural Finance

21. Land and Natural Resource Management

Paper Abstract:

Degradation of natural capital poses a risk to businesses due to their dependency and impacts on nature. There is also a growing interest among the farming sector to utilize natural capital more effectively, as well as among investors to invest in natural capital for both financial and environmental returns. The agricultural system and surrounding natural capital jointly form a composite ‘production landscape’, where the value of natural capital can be monetized to develop natural asset companies that could attract potential investors. In this context, we aim to understand barriers and opportunities perceived by landowners to manage natural capital in agricultural systems as an asset class and by investors to invest in 'natural capital production landscape'. We surveyed different types of landowners (supply side) and investors (demand side) in Australia to identify the barriers and opportunities associated with such a scheme. Both landowners and investors identified multiple barriers and opportunities in ‘natural capital production landscape’ approach. For example, barriers include proven ways to diversify farming profit to make landowners more resilient, as well as a lack of tangible and profitable natural

capital projects to invest in for investors. Similarly, both groups identified opportunities to incorporate natural capital into their businesses through the rehabilitation of waterways, improved soil health, and the establishment of biodiversity corridors. Overcoming barriers and leveraging opportunities in natural capital production through a landscape approach can create substantial benefits to landowners and investors. With Australia's policy landscape increasingly supporting natural capital in agriculture, this approach could enhance resilience among landowners, provide sustainability-linked returns for investors, and ultimately lead to better economic and environmental outcomes for society.

Parallel Session: Resources & Environment

13:00 - 14:20 Friday, 13th February, 2026

P Riverbank R5

Sherzod Akhundjanov

Extracting trade-offs: The effect of Gold mining on agriculture and farm labor in Tanzania

Hosam Ibrahim

University of Minnesota, Saint Paul, USA

Keywords:

3. Agricultural Production

14. Environmental Economics

Paper Abstract:

This paper investigates how the opening of a new gold mine in Tanzania affects nearby agricultural production and labor allocation in the short run. Using a two-period panel of farm households from the LSMS-ISA and a 2x2 difference-in-differences design, I isolate the local impact of one mine that began operations in 2012. The results show that farms within 15 km of the mine reduced household labor and planted area, resulting in lower total output but significantly higher labor productivity—without evidence of yield declines or worsening soil quality. These findings suggest that labor market competition, rather than environmental degradation, is the dominant short-run mechanism through which mining affects agriculture.

Optimal Exploration of a Finite Resource and Accumulation, Consumption and Prices of Discovered Reserves

Ivar Ekeland[1], Peter Tankov[2], Wolfram Schlenker[3], Brian Wright[4]

[1]CEREMADE, Universite Paris-Dauphine ‡School of International and Public Affairs, Paris, France. [2]ENSAE, Institut Polytechnique de Paris, Paris, France. [3]Kennedy School, Harvard University, Cambridge, USA. [4]Agricultural and Resource Economics UC Berkeley, Berkeley, USA

Keywords:

14. Environmental Economics

24. Mathematical Programming

Paper Abstract:

We solve a model of optimal exploration of a finite resource and accumulation and consumption of discovered reserves, a problem at the core of natural resource economics. Building on Arrow and Chang (1982), the states are proven reserves and unexplored resources,

the controls are consumption and (constant-cost) exploration. We prove that optimal exploration episodes are instantaneous "impulses," ending only at a discovery or exhaustion. We derive a non-local alternative to the standard HJB equation to solve this non-local impulse control problem. The solution is completely determined by a frontier of critical proven reserves. Given resources, reserves above the threshold fall vertically in consumption mode; below it, exploration impulses proceed horizontally. We prove that discounted price is a martingale; an "expectational Hotelling rule" holds at any given price. The frontier distinguishes three regimes. Within Regime I, reserves cycle with negligible trend, exploration frequency declines, and price cycles around a trend below the interest rate, r. In Regime II resources are lower, and the frontier rises sharply as resources decline, and part of each discovery accumulates to become, at exhaustion, the initial stock in the third regime, a Hotelling model. Within Regime II exploration frequency is higher, price can rise or fall at an impulse, and price paths cycle around a very modest linear trend well below r, jumping at exhaustion.

Fracking and Agriculture: The Case of Kern County, California

Wai Yan Siu[1], Sherzod Akhundjanov[2]

[1]Old Dominion University, Norfolk, USA. [2]Utah State University, Logan, USA

Keywords:

3. Agricultural Production

13. Energy and Utilities

Paper Abstract:

Technological advancements in directional drilling and hydraulic fracturing have greatly expanded access to previously inaccessible rock formations, fueling the so-called "Shale Revolution" in the United States. Hydraulic fracturing, commonly known as fracking, is a water-intensive technique used to extract oil and natural gas from shale formations. Fracking has enabled the United States to increase domestic production of oil and natural gas, thereby lessening reliance on imports and contributing to improvements in a broad range of economic indicators. Hydraulic fracturing has also been linked to a range of negative externalities. Despite anecdotal evidence and media reports suggesting adverse effects of hydraulic fracturing on agriculture, there is a lack of studies measuring these impacts empirically.

In this study, we examine the impact of hydraulic fracturing on agricultural productivity in Kern County, California, a leading county for both agricultural production and unconventional oil and gas extraction. Using parcel- and county-level analyses, we assess yield responses of major crops grown in the region. Our results indicate that fracking's effects vary across crop types and spatial scales. While localized impacts can be substantial, broader county-level patterns suggest adaptive responses that buffer against some negative effects. These findings highlight the need for targeted, crop-specific monitoring and caution against generalizing farm-level impacts without accounting for broader agricultural system dynamics.

Our study contributes to the agricultural and energy economics literature by shedding light on the nature and extent of the effects of unconventional oil and gas infrastructure on agricultural productivity, using Kern County, California, as a case study. In so doing, the paper also intersects with the industrial organization literature on inter-industry externalities. To the best of our knowledge, this is the first study to leverage both cross-sectional and inter-temporal variation in crop yields to analyze the dynamic, crop-specific productivity effects of hydraulic fracturing at multiple spatial scales. Given that many oil- and gas-producing regions in the United States and Canada often have a large agricultural presence, our findings carry important policy implications for the co-existence of agriculture and energy development.

Parallel Session: Land & Resource Management

13:00 - 14:20 Friday, 13th February, 2026

P Riverbank R6

Chair: Praseed Thapa

Do People Minimize Regret? A Coastal Adaptation Choice Experiment from Yanchep, Western Australia

Dinh Khanh Le, Michael Burton, Abbie Rogers, Curtis Rollins

UWA Centre for Environmental Economics and Policy, Perth, Australia

Keywords:

14. Environmental Economics

21. Land and Natural Resource Management

Paper Abstract:

Discrete choice experiments are a useful tool to value coastal assets under coastal hazard and adaptation scenarios. However, the random utility maximisation (RUM) framework that typically underpins modelling of discrete choices has been criticised for lacking behavioural realism, particularly because it assumes respondents are rational and have fully compensatory trade-off behaviour. The random regret minimisation (RRM) framework offers an alternative decision rule which relax those assumptions and is often reported to improve model fit with differences in predicted probabilities . As a result, it leads to different recommendations for policy appraisal. As random regret minimisation model is linked to loss aversion, we expect respondents in our survey to minimise anticipated regret due to coastal adaptation choices are characterised by coastal risks and partly irreversible asset loss. In this study, we use data from a stated preference coastal community valuation study in Yanchep, Western Australia, to examine decision-rule heterogeneity by estimating a range of RRM-based multinomial logit (MNL) models and hybrid RUM-RRM latent class models.

A choice experiment was developed to measure public preferences and value estimates for coastal assets and infrastructure under threat from coastal erosion. In each choice task, scenarios were defined by a monetary cost, the amount of recreational beach space, the quality of a lagoon area that is popular for swimming and snorkelling, the extent of terrestrial nature reserve, the quality of beach access, and whether other built amenities that support coastal recreation would be maintained.

Contrary to expectations, we find no evidence of regret choice behaviour at aggregate level in this sample. In the MuRRM-MNL model, the μ coefficient tends to infinity, which implies that the MuRRM model is going to collapse into the RUM model. Indeed, the RUM-MNL model has the best model fit and outperforms its counterpart RRM-MNL models in the Ben-Akiva and Swait test. In the hybrid latent class model *(2 muRRM classes and Status quo class)*, the μ1 and

μ2 coefficients were estimated at 10.423 and 6,052.688, respectively. When μ coefficient is higher than 5, the MuRRM model is best described by RUM model. This implies that RUM models are better presented in all subgroups of the Yanchep data. Consequently, the latent class model achieved the best model fit and information criteria *(AIC, BIC)* among hybrid latent class models. We conclude that RUM models are better presented Yanchep data at aggregate level and sub-group level.

We further find that when respondents overlook the status quo alternative in a three-option choice scenario design, the Classical RRM model becomes observationally equivalent to a RUM model. This indicates that practitioners should assess respondents' attendance to the status quo option in a choice experiment prior to interpreting RRM models. We find that preference estimates relevant to recreational outcomes of coastal adaptation decisions remain robust regardless of whether the RUM framework or the RRM framework is employed in this instance. Our findings contribute to methodological practices for testing for the presence of regret minimisation in discrete choice experiments.

Disaggregated Evidence on Sustainable Agricultural Practices Adoption among Smallholder Rice Farmers in Indonesia

Arif Yustian Maulana Noor, Budi Setiawan, Moh Shadiqur Rahman, Hery Toiba

Universitas Brawijaya, Malang, Indonesia

Keywords:

21. Land and Natural Resource Management

26. Practice Change and Adoption

Paper Abstract:

The uneven and selective implementation of Sustainable Agricultural Practices (SAP) hinders rural sustainability policy planning. Current empirical research often generalises farmer action by relying on composite adoption scores, failing to capture variation in how and why individual practices are adopted. This study mitigates that constraint by presenting a multidimensional approach that examines various SAP components and reveals variance among smallholder rice farmers. The study analyses data from 357 respondents in Malang Regency, East Java, Indonesia, employing rigorous statistical methods to evaluate the impact of demographic, institutional, and livelihood-related factors on each component of the SAP. The analysis uncovers distinct adoption trajectories influenced by tenure security, availability of agronomic assistance, and the interplay between agricultural and non-agricultural employment. The analysis indicates varied adoption routes influenced by tenure security, availability of agronomic assistance, and the interplay between agricultural and non-agricultural employment. The study offers a new empirical lens to understand sustainability uptake in smallholder settings and supports a more context-sensitive design of agricultural interventions.

Trade-offs and Synergies of Multidimensional Successes of Natural Resource Management Activities: Insights from National Data

Bassie Limenih, Natalie Stoeckl, Amber Tsai

University of Tasmania, Hobart, Australia

Keywords:

5. Biodiversity

21. Land and Natural Resource Management

26. Practice Change and Adoption

Paper Abstract:

Natural Resource Management initiatives are increasingly expected to deliver outcomes beyond ecology, encompassing social and economic dimensions – and are undertaken in the face of great uncertainty. However, the existing studies often focus on a single aspect of natural resource management outcomes, without providing an integrated view of how different outcomes interact, or which different outcomes were sought. Different types of successes may involve complex trade-offs and synergies that are not always well understood and explicitly evaluated. To address this gap, we explored the interplay between ecological, social, and economic dimensions of perceptions of success in natural resource management activities. Using data collected in a national survey, we used responses to questions about the motivators (goals) for participating in various programs and respondents' perceptions of whether those goals were achieved (too early to tell; unable to judge, or on Likert-scale from 0 (not achieved at all) to 5 (fully achieved). We focus here upon the subset of data where respondents were able to rate achievements using the Likert scale. We first used both Principal Component Analysis (PCA) and Factor Analysis (FA) to reduce the dimensionality of observed indicators across social, ecological, and economic domains. The extracted latent factors are then modelled using Structural Equation Modeling (SEM) to examine their interrelationships. Our PCA results reveal a positive synergy among the on-farm objectives; these always grouped together. If allowing only 3 components, our ecological objectives also grouped together, as did social objectives. Some tests suggested that there were more than 3 components, and in these situations, the ecological objectives split into two (enhancement of habitat and protection of species), and the social objectives split into three (personal, those relating to knowledge and those relating to social capital). Our SEM provides evidence of some cross-domain synergies, suggesting that there is not always a trade-off, and that one need not choose between pursuing economic, social or ecological goals. Regret/disappointment theory suggests that a person's perceptions about whether or not participation in an activity has been 'successful', will depend upon what their goals were before starting. Therefore, we also compared (perceived) achievement scores with scores that tell us how important each goal was as a motivator. This allowed us to identify a subset of goals that were both important and deemed to have been well achieved (mostly ecological and social) and to identify goals where perceived achievements exceeded importance – the *pleasant surprises*. These were most often economic or social, suggesting that there may be both economic and social co-benefits to natural resource management activities (even when motivators are primarily ecological).

Assessing adoption of grazing practices under different support mechanisms in the Great Barrier Reef catchments: an expert elicitation approach

Praseed Thapa[1,2], John Rolfe[1], Megan Star[1]

[1]CQUniversity, Rockhampton, Australia. [2]Agriculture and Forestry University, Rampur, Nepal

Keywords:

21. Land and Natural Resource Management

26. Practice Change and Adoption

Paper Abstract:

The Australian and Queensland governments have made substantial investments to improve water quality outcomes from agriculture in the Great Barrier Reef (GBR) catchments. However, adoption rates among landholders remain well below the targets. In this study, we report the use of a Delphi process with adoption experts to predict the amount of change possible under different policy settings. Using the *'Investigate'*, *'Discuss'*, *'Estimate'*, and *'Aggregate'* protocol, this study collected data from twenty-three experts to estimate the adoption change of three grazing practices: managing stocking rates, pasture spelling, and landscape rehydration. The experts were asked what would be the change in adoption among current non-adopters if support mechanisms such as extension, on-farm trials, incentives, or farmer networking were to double over the next decade. Preliminary observations suggest that the adoption of stocking rates and pasture spelling could be higher in rangeland and coastal grazing systems when all the support mechanisms are combined, while adoption of landscape rehydration could be lower in coastal systems, as estimates show that non-adopters may only be aware of the practice but not adopt it. The findings have important implications for policy and other stakeholders in designing future work to improve adoption in GBR catchments.

Parallel Session: Farm Management & Environment

13:00 - 14:20 Friday, 13th February, 2026

P Riverbank R6B

Chair: Keisaku Higashida

Promoting Environmentally Friendly Practices in High-Value Tea Production The Role of Cooperatives in Sri Lanka

Wenguang Zhang

Lincoln University, Canterbury, New Zealand

Keywords:

15. Farm Management and Farmer Behaviour

26. Practice Change and Adoption

Paper Abstract:

This study examines how cooperative membership shapes the uptake of environmentally friendly practices among Sri Lankan tea farmers. Using primary data from a 2025 survey of 701 tea-producing households spanning the country's major tea-growing regions, we estimate a conditional mixed process (CMP) model to address potential endogeneity in cooperative membership. Membership is measured as a binary indicator, as are three practice outcomes: intercropping, mulching, and water management. The results show that cooperative participation significantly increases adoption of intercropping and mulching, consistent with mechanisms of peer learning, shared input procurement, and coordinated training. We also uncover heterogeneous effects across the income distribution: low-income farmers exhibit stronger gains from membership in adopting mulching—likely reflecting liquidity and risk-mitigation benefits from collective action—whereas higher-income farmers are more responsive to cooperative support for water management, a practice that typically requires greater upfront investment and complementary infrastructure. These findings underscore the central role of agricultural cooperatives in accelerating sustainable production transitions. Policy should leverage cooperatives as platforms for targeted extension, farmer-to-farmer diffusion, and access to alternative inputs and services, while tailoring interventions to income-specific constraints and incentives. By explicitly modelling the endogeneity of cooperative membership with CMP, this study offers robust evidence on the pathways through which cooperatives foster the adoption of sustainable agricultural practices in smallholder tea systems.

Bio-economic modelling for mitigating GHG emissions on New Zealand dairy farm systems

Erandi Kalehe Kankanamge, Thiagarajah Ramilan, Peter Tozer

Massey University, Palmerston North, New Zealand

Keywords:

15. Farm Management and Farmer Behaviour

24. Mathematical Programming

Paper Abstract:

New Zealand dairy farmers face increasing pressure to reduce greenhouse gas (GHG) emissions while maintaining profitability under volatile market and climate conditions. We developed a bioeconomic whole-farm model using mixed-integer linear programming (MIP) to find the optimal mix of management practices that maximises profit subject to emission constraints for a range of farming systems. Key practices are varying nitrogen (N) fertiliser application, changing stocking numbers, imported supplement substitution, tree planting and reducing effluent emissions. The model integrates a biophysical module (pasture production, cow energy balance, supplement substitution) with an economic module (milk revenue, input costs) and a GHG emission module. Constraints enforce emissions targets and budget limitations. Scenarios were simulated to evaluate mitigation trade-offs. Preliminary results showed that the optimal mitigation profile varied for changes under volatile market and climate conditions. High input intensity favoured supplement changing and ecopond for emissions reductions, while low input farm types prioritised stocking rate adjustments and tree planting. The model identified the trade-off between farm profit and emission reduction among varying combinations of mitigation. Optimal combinations are sensitive to farm systems in terms of their input use intensity and changes in climate and market prices for milk solids. This modelling approach provided a scalable framework for building sustainable dairy systems in New Zealand.

Agricultural Mitigation Measures and the Value of Water Quality Improvements

Geir Gustavsen, Marianne Bechmann, Sigrun Kværnø, Jian Liu, Divina Rodriguez

Norwegian Institute of Bioeconomy Research, Aas, Norway

Keywords:

14. Environmental Economics

15. Farm Management and Farmer Behaviour

Paper Abstract:

Agriculture is one of the main sources of water pollution in Norway. In food production, manure and fertilizers are used as inputs and can be transported via surface and subsurface runoff to water bodies. Mechanical soil disturbance (e.g., tillage) alters the soil's water-holding capacity. Soil erosion reduces soil quality and negatively affects terrestrial ecosystems. It also contributes to water pollution by transporting nitrogen (N) and phosphorus (P) to aquatic environments. Therefore, mitigation measures should aim to enhance water and material retention within the landscape.

The objective of this paper is to explore how agricultural mitigation measures can be implemented to reduce water pollution. We focus on two heavily polluted lakes in eastern

Norway. These lakes also flow into the Glomma River, Norway's main river, which serves as a freshwater source for approximately 150,000 people. Furthermore, the river flows into the Oslo Fjord, a recreational area for residents of Norway's capital and surrounding regions.

Using an empirical catchment-scale model designed to estimate soil and phosphorus losses from agricultural land, we find that the two lakes could achieve good ecological status under the EU Water Framework Directive if the following mitigation measures are implemented: no autumn tillage on all farms within the respective watersheds; 8-meter buffer zones along rivers and streams running through agricultural land; catch crops and grass-covered waterways in agricultural fields; and reduced fertilizer use.

The two lakes, Bjørkelangen in the Haldenvassdraget watershed and Ertevannet in the Glomma Sør watershed, are currently classified as being in poor ecological condition according to the five-point scale of the Water Framework Directive. Using a benefit transfer model, we find that residents of the two watersheds are willing to increase their taxes by approximately €220 per year to achieve good ecological status in the lakes.

This paper discusses the proposed mitigation measures, the benefit transfer results, and the economic analyses related to costs and benefits.

Sustainability Certification, Price, and Intrinsic Preference of Coffee Farmers in Vietnam

Keisaku Higashida[1], Keiichiro Honda[2], Mai Nguyen Ngoc[3], Thong Q. Ho[4]

[1]Kwansei Gakuin University, Nishinomiya, Japan. [2]Prefectural University of Kumamoto, Kumamoto, Japan. [3]Foreign Trade University, Hanoi, Vietnam. [4]University of Economics Ho Chi Minh City, Ho Chi Minh City, Vietnam

Keywords:

3. Agricultural Production

15. Farm Management and Farmer Behaviour

Paper Abstract:

Over the past few decades, international sustainability certification systems such as Fair Trade, Rainforest Alliance, and 4C have been introduced and widely adopted with the aim of improving the welfare of agricultural producers, protecting the environment, and ensuring ethical labor practices. However, despite numerous studies examining whether there are differences in sales prices, income, and other factors between certified and non-certified farmers, the results have been mixed.

The purpose of this paper is to provide evidence on whether there are significant differences between certified and non-certified coffee farmers in Vietnam in terms of (i) economic factors, such as selling price, wage, and labor input per hectare, (ii) agricultural inputs, such as agrochemical use, fertilizer use, and the ratio of inorganic and organic fertilizers, and (iii) intrinsic preferences, such as risk and time preferences.

These two preferences are considered important for certification acquisition behavior and the effects of certification. For example, production methods that meet certification standards carry the risk of reduced production compared to conventional farming methods. Furthermore, when sustainability elements are included in certification standards, producers must consider not only current benefits but also future benefits.

To achieve the research objective, we conducted interviews with 528 coffee farmers in Dak Lak and Lam Dong provinces in the Central Highlands of Vietnam in March 2025. In addition to questions on demographics and agricultural production activities, we included hypothetical questions on risk and time preferences.

We employ several empirical strategies to examine the relationship between certification status and farmer characteristics. First, we use kernel density plots to visually compare the distribution of continuous variables across groups. To formally assess differences in distribution, we conduct Kolmogorov–Smirnov (KS) tests. For categorical variables, we apply chi-square tests to evaluate whether distributions differ significantly between certified and non-certified farmers.

The analysis revealed that there is no significant difference in economic factors between certified and non-certified farmers. However, our data indicated that there is significant differences in agricultural inputs and intrinsic preferences. Regarding agricultural inputs, we found that (i) certified farmers apply larger quantities of both inorganic and organic fertilizers compared with non-certified farmers, and (ii) certified farmers rely relatively more on organic fertilizers than on inorganic fertilizers. Regarding intrinsic preferences, we found (iii) certified farmers are significantly more far-sighted than non-certified farmers.

Parallel Session: Climate Change & Markets

13:00 - 14:20 Friday, 13th February, 2026

P Riverbank R8

Chair: Christophe d'Abbadie

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81 From moral hazard to carbon hazard: Unpacking the relationship between crop insurance and net-zero pathway

Shuay-Tsyr Ho

National Taiwan University, Taipei, Taiwan

Keywords:

8. Climate Change

15. Farm Management and Farmer Behaviour

28. Uncertainty and Risk

Paper Abstract:

Crop insurance has been a central topic in public discussions addressing production risks faced by farmers. In the United States, the participation rate in crop insurance programs remains high, covering a substantial portion of agricultural production. In Taiwan, the crop insurance program, which began as a pilot in 2017, has seen coverage rates rise steadily, reaching more than 50% by 2025. Since 2022, the Taiwanese government has implemented a mandatory insurance program for paddy rice, aiming to replace the existing disaster payment system. This mandatory revenue insurance not only alleviate losses but also encourages the production of high-quality rice through add-on insurance products promoting more environmentally friendly farming practices. Concurrently, net-zero strategies have been pursued globally by various industries and governments as essential measures to tackle greenhouse gas emissions and combat climate change. Existing research on crop insurance highlights its effects on production: on the extensive margin, insurance tends to increase production acreage, while on the intensive margin, it encourages greater input usage. Fertilizer use in rice production is a significant contributor to greenhouse gas emissions, particularly methane and nitrous oxide, which complicates efforts to align agricultural risk management with climate mitigation goals. This study addresses a significant research gap concerning the relationship between crop insurance and climate change mitigation strategies. Specifically, it examines whether crop insurance, designed to mitigate production risks, may inadvertently conflict with net-zero objectives by encouraging input use that increases emissions. Using farm-level data from Taiwan, we first identify the causal impact of crop insurance program on farmers' input use behaviors that may diverge from net-zero pathways. Second, we investigate the underlying mechanisms of moral hazard behavior commonly observed in crop insurance programs. We propose that input use in the context of insurance participation should be reconsidered: if increased input use does not

serve to inflate indemnity payments—particularly under Taiwan's mandatory insurance program, which includes add-on products rewarding environmentally-friendly practices—then moral hazard might be better conceptualized as a "carbon hazard," reflecting unavoidable emissions increases linked to farmers' efforts to secure insurance payoffs and production guarantees. Exploiting the implementation of the mandatory insurance policy, our analysis of the intensive margin reveals a significant increase in fertilizer use following policy adoption, controlling for township and year fixed effects that capture relevant policy influences and geographical heterogeneity in rice production due to agronomic and cultural factors. We further categorize farmers based on whether their fertilization practices align with rational fertilization criteria and find notable heterogeneity, with variations explained by farmers' experience, education, age, and location. Controlling for geographical differences, the primary source of carbon hazard appears to be farmers who rely excessively on fertilizer to maintain production levels. This research extends the policy implications of crop insurance programs by emphasizing the need to consider the carbon footprint associated with input use. To reconcile the dual policy goals of risk management and emissions reduction, promoting rational fertilization practices and subsidizing organic fertilizers emerge as crucial instruments to mitigate potential policy conflicts arising from a single-objective focus.

Leveraging carbon farming as a dual strategy for smallholder farmers' income and climate stewardship in developing countries: Evidence from Nepal

Khem Raj Joshi, Ammar Abdul Aziz, Rajendra Adhikari

The University of Queensland, Brisbane, Australia

Keywords:

8. Climate Change

26. Practice Change and Adoption

Paper Abstract:

Climate change presents an urgent and multifaceted challenge, impacting environmental, social, and economic systems at local, regional, and global levels. While the remaining global greenhouse gas (GHG) emission limit is rapidly diminishing, achieving the 1.5°C target set by the Paris Agreement requires immediate and coordinated actions across all sectors, both in reducing GHG emissions and enhancing carbon sequestration. Smallholder farmers, who represent over two-thirds of the global farming population, cultivate only 12% of the world's agricultural land yet contribute 70-80% of the global food production. This demographic presents a significant potential for climate change mitigation. However, the smallholder-led agriculture in developing countries remains largely overlooked in policy frameworks that support climate change mitigation. Unlocking this untapped potential is therefore critical to achieving global climate goals. This study is proposed in Nepal, a country with a negligible contribution to global GHG emissions but highly vulnerable to climate change, where smallholder agriculture dominates. This research aims to assess the broader impact of carbon farming on land-use change, poverty reduction, and employment generation. The computable

general equilibrium model will be employed to evaluate the effects of incentive mechanisms, specifically payments for carbon units generated through mitigation practices. The findings are expected to inform the development of inclusive and evidence-based policies that promote carbon farming as a dual strategy for enhancing the income of smallholder farmers and promoting climate stewardship in developing countries.

Keywords: Climate change, carbon farming, smallholder farmers, developing country, Nepal

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Mediterranean-climate grain enterprise emission intensities and gross margins: A comprehensive temporal and spatial analysis

Christophe d'Abbadie

Department of Primary Industries and Regional Development, WA, Perth, Australia

Keywords:

1. Agribusiness

7. Carbon and Nature Markets

Paper Abstract:

This comprehensive study examines greenhouse gas emissions intensities and economic performance of grain enterprises across Western Australia and South Australia's Mediterranean climate regions, utilizing six distinct data sources spanning 2002-2025. The research quantifies emissions trajectories, economic trade-offs, and regional variations for wheat, barley, canola, lupins, and pulse crops across 12 million hectares of broadacre cropping with an annual farmgate value exceeding AU$8 billion.

Drawing on South Australian and Western Australian gross margin guides, farm benchmarking datasets, life cycle assessments, and the Carbon Neutral Grain Pilot program, we employ consistent emissions accounting methodologies aligned with Australia's National Inventory Report. Emissions intensities are reported as kg CO_2-e per tonne of grain across low (<350mm), medium (350-400mm), and high (>400mm) rainfall zones, enabling comprehensive spatial and temporal comparisons.

Key findings reveal divergent sustainability trajectories across crop types. Cereal crops demonstrate substantial emissions intensification, with wheat emissions per hectare increasing 104% and barley 63% over the study period, reflecting agronomic intensification. Conversely, nitrogen-fixing legumes maintain remarkable stability, with lupins showing only 35% increase despite yield improvements. Canola exhibits the highest emissions intensities (600-900 kg CO_2-e/t) but demonstrates strong positive correlations between gross margins and emissions across all rainfall zones.

Critically, analysis of farm performance distributions reveals that top-quartile farms achieve superior economic returns while maintaining competitive emissions efficiency across all crops and regions. These farms demonstrate that sustainable intensification is achievable without compromising economic viability, exemplifying feasible pathways for broader industry adoption.

Regional patterns show high rainfall zones generate highest absolute emissions per hectare but lowest per tonne, while low rainfall regions face inherent efficiency challenges requiring differentiated management approaches. Temporal analysis reveals accelerating emissions intensity post-2010, particularly in medium rainfall zones where yield improvements have not matched input intensification.

The research provides three strategic insights for policy development: (1) legumes emerge as critical system components for sustainability due to stable emissions profiles and nitrogen-fixing services; (2) substantial emissions reductions are achievable through supporting adoption of proven best practices already demonstrated by top-performing farms; (3) effective emissions reduction strategies must be crop-specific and regionally differentiated rather than uniform across agricultural systems.

These findings inform evidence-based pathways toward carbon neutrality in Australian grain production while maintaining international competitiveness and food security objectives. The analysis demonstrates that economic and environmental objectives can be aligned through skilled management and targeted policy interventions, supporting Australia's commitments under international climate agreements while enhancing the sustainability credentials of Australian grain in global markets.

Parallel Session: Agricultural Production Decisions

13:00 - 14:20 Friday, 13th February, 2026

P Riverbank R8B

Chair: Michael Young

Price Setting in Agricultural Contracts

Rachael Goodhue

University of California, Davis, Davis, USA

Keywords:

15. Farm Management and Farmer Behaviour

30. Value Chain Analysis and Marketing

Paper Abstract:

Private contracts, particularly between producers and first handlers, are an important class of institutions in agriculture in both developed and, increasingly, developing countries. Contract provisions may be implemented to align incentives, define the nature of the desired coordination, or reduce transaction costs and the scope for opportunism. As a whole, they determine the distribution of risks and returns between the parties. While not the sole determinant of risks and returns within a contract, pricing mechanisms are an important part of contract design. This paper examines the choice of a pricing mechanism in an agricultural production contract, how that mechanism interacts with other contractual terms, and market-level effects of contract pricing mechanisms.

Within the context of agricultural production specifically, pricing mechanisms vary across commodities, sometimes in ways that are consistent with commodity characteristics. There is also heterogeneity in contractual terms for the same commodity, depending on the needs and preferences of the contracting parties. Understanding the motivations behind the choice of a contractual provision regarding pricing is important for evaluating its impact on the welfare of contracting parties.

While pricing mechanisms are an important driver of participants' risks and returns, they cannot be considered separately from other contract terms. For example, holding the pricing provision constant, reducing the length of a contract may alter the expected return on an investment used in production, depending on its value in its next-best use. Maintaining the design of the pricing provision and increasing its expected value can offset any such negative impact of a shorter contract. In terms of incentive alignment, multiple provisions provide multiple tools for affecting participants' decisions. Specific pricing mechanisms may require the inclusion of additional contract provisions to address incentives created by the pricing provision itself, such as ex-post opportunism.

Pricing provisions have broader impacts than the direct effects on participants. Pricing specifications can influence the broader market for the commodity in question, having a horizontal impact. They can also have vertical impacts through interrelationships with other levels of the agrifood chain, such as land rental markets and processer-retailer relationships. An understanding of the potential for such interrelationships to alter the incentives facing the parties to a farmgate contract deepens the analysis of that contract.

This paper will address each of these considerations after providing background institutional information and a taxonomy of agricultural pricing mechanisms.

Can New Agricultural Business Entities Promote Farmers' Green Production? An Analysis Based on the Cognition-Behavior Framework

Chen Chen, Jingyu Sun, Chunlin Hua

Southwest University of Science and Technology, Mianyang, China

Keywords:

3. Agricultural Production

26. Practice Change and Adoption

Paper Abstract:

The widespread adoption of green production practices by farmers can effectively promote the green and low-carbon transformation of agriculture and achieve agricultural modernization goals. New Agricultural Business Entities (NABEs) are considered a key driving force in promoting farmers' green production. Based on 3,633 micro-survey data collected from 79 cities across 23 provinces nationwide, this paper focuses on cooperation between farmers and NABEs. Using a "cooperation-cognition-behavior" analytical framework, we explore how cooperation with NABEs and different cooperation modes influence farmers' green production behavior and identify the mediating mechanisms of awareness of agricultural pollution and information channels.

The results indicate that cooperation with NABEs, especially through contract farming, significantly increases farmers' use of organic fertilizers and farmyard manure but does not promote the adoption of precision fertilization. Both technical services and profit-sharing arrangements encourage the use of farmyard manure; however, profit sharing is also associated with reduced adoption of precision fertilization. Mediation analysis shows that awareness of agricultural pollution and the information channels function as effective mediators: as farmers' awareness rises and their information channels expand, the influence of NABEs on green production behavior diminishes and may even be supplanted. Heterogeneity analysis further suggests that agricultural training and environmental organizations can partially substitute for NABEs' roles in information dissemination and technical services.

Based on these findings, this paper recommends further cultivating the development of NABEs and tailoring green technology extension strategies according to the characteristics of different cooperation modes. In contract farming, the linkage between quality standards and price

incentives should be strengthened. In technical services, the dissemination and training of practical technologies should be enhanced. For profit-sharing arrangements, greater emphasis on cost–benefit analysis and the long-term returns can maximize the effectiveness of each cooperation mode in advancing green production. Moreover, for farmers with lower levels of awareness and limited information channels, policy should prioritize the baseline functions of technology extension, information provision, and standardized services. For farmers with higher awareness and better access to information, NABEs should pivot toward value-added services—such as personalized consulting, advanced technical support, and market linkages—while avoiding one-size-fits-all promotion.

Evaluating cropping system performance under production and price risk using on-farm trials in eastern Zambia

Adam Komarek[1], Chloe MacLaren[2,3], Blessing Mhlanga[3], Hambulo Ngoma[3], João Vasco Silva[4,3], Christian Thierfelder[3]

[1]The University of Queensland, Gatton, Australia. [2]Department of Crop Production Ecology, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden. [3]International Maize and Wheat Improvement Center (CIMMYT), Sustainable Agrifood Systems, Harare, Zimbabwe. [4]Plant Production in the Tropics and Subtropics, University of Hohenheim, Stuttgart, Germany

Keywords:

3. Agricultural Production

28. Uncertainty and Risk

Paper Abstract:

Smallholder farmer decisions are influenced by both risk preferences and variability in production and prices. However, their combined implications for valuing crop diversification remain underexplored—particularly in markets where yields are uncertain and legume prices are volatile. We evaluated the risk-adjusted performance of crop diversification through legume rotations and intercropping, combined with no tillage and crop residue retention, under production and price risk. Our analysis applied a parametric moment-based approach with partial second moments using 1,169 observations from on-farm trials conducted with 77 farmers over eleven cropping seasons (2011–2012 to 2021–2022) in six communities in Zambia's Eastern Province.

Compared to the control of maize monocropping with tillage and crop residue removal, rotation had lower cropping-system yield variance, via spatial and temporal diversification, but also lower mean cropping-system yield (−2.9 GJ ha^{-1} $season^{-1}$, not significant, in animal traction maize-soybean systems and −10.6 GJ ha^{-1} $season^{-1}$, $p < 0.01$, in manual maize-cowpea systems). With a maize-cowpea: rotation delivers stability of yield and gross value, but at the expense of average performance. With soybean: rotation delivers stability of yield and higher average gross value, but with higher variance of gross value. The shadow cost of risk bearing—the risk premium—amounted to 9–22% of expected cropping-system value under the control and 8–19% under rotation, assuming moderate risk aversion through a constant relative risk aversion

coefficient of 2.5. These differences in mean and variance altered treatment rankings when assumed risk preferences were included. Intercropping gave the highest cropping-system value despite having the highest variance. Rotation surpassed the control for cropping-system yield in animal traction maize-soybean systems for highly risk-averse preferences (. No-Tillage overtook intercropping for both cropping-system yield (and cropping-system value ().

Our results indicated the substantial economic cost of risk and how crop diversification was associated with changes in both mean returns and risk premiums. Ignoring risk in these cropping systems may understate the attractiveness of crop diversification and misguide policy or extension decisions, underscoring the need for analysis of long-term cropping strategies.

Can farmers' tactical decisions jointly lift profits and lower emissions in a mixed enterprise farm system?

Michael Young[1,2], Ross Kingwell[3], John Young[4]

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Keywords:

3. Agricultural Production

24. Mathematical Programming

Paper Abstract:

This study assesses how weather-year dependent sheep and crop management tactics affect farm profitability and farm system greenhouse gas emissions in the central Great Southern region in Australia. To investigate the impact of farmers' tactical decisions on farm profit and emissions a whole farm optimisation model known as the Australian Farm Optimisation Model is employed. The model describes a typical mixed enterprise farm, the weather-year variation that underpins the farm system and the plethora of strategic and tactical management options available to the farm manager. Modelling results reveal that reliance on all tactical management options increases expected farm profit by 22% but expected emissions increase by 11%, although the emissions intensity with respect to farm profit is reduced. Access to tactical options can greatly affect profits and emissions in particular types of weather-years. Emission and profit outcomes reflect a combination of direct effects of individual tactics and the strategic structural shifts they trigger across the whole farm (enterprise mix, stocking rate), underscoring the value of whole-farm optimisation models for guiding management and policy. The modelling results also reveal that assessing the value and emission impact of any tactic likely depends on what other tactics are already available to the farm manager. This indicates the need for whole farm system analysis if the stacking or bundling of tactical options in agricultural systems is to be properly understood and estimated.

Keith Campbell Address - Dr. Salomón Salcedo: Politics interference with effective agricultural and rural development policy: the elusive results-based public management approach in developing countries

14:30 - 15:30 Friday, 13th February, 2026

P Riverbank R2-R4

Awards and Conference Closing

15:30 - 16:00 Friday, 13th February, 2026

P Riverbank R2-R4

2026 AARES LOC members:

- **Chair:** Sarah Wheeler (Flinders University)
- **Website:** Akwasi Ampofo (Adelaide University); Rida Akzar (Adelaide University); Di Zeng (Adelaide University)
- **Venue selection:** Vandana Subroy (University of Western Australia)
- **Social events (Dinner, ECR night, social night, WEN session, pre-conference tour):** Constantin Seidl (Flinders University); Joshua Moore (SA Power); Iain Fraser (University of Kent); Daniel Gregg (Flinders University); Bethany Cooper (Adelaide University); Jeff Connor (Adelaide University)
- **Finance:** Alec Zuo (Flinders University); Arif Watto (CSIRO); Masood Azem (CSIRO)
- **Program:** Stephanie McWhinnie (Adelaide University); Lin Crase (Adelaide University)
- **Sponsorship:** Steele West (ATCO Australia Ltd); Daniel Hill (FAO)
- **Conference theme/keynote speakers:** Emilio Morales (University of New England)
- **Social media:** Disha Gupta (Indira Gandhi Institute of Development Research)
- **Media:** Lucy Broad (Lucy Broad Strategic Communications)